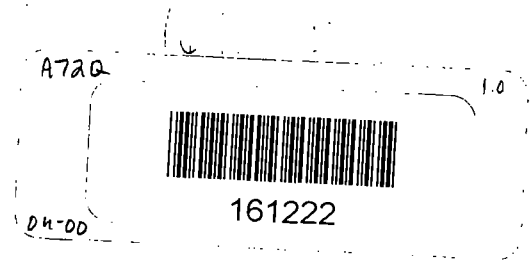
SIFCoded
5/16/88

Site: Atlantic
ID #: IAD029954300
Breaks: 1 of 1
Other:
4-22-88

Final Report
Site Investigation
Atlantic Public Water Supply
Atlantic, Iowa

Site # Z34 Project # 001
TDD # F-07-8701-15 PAN # FIA0194SA
Prepared By: E & E/FIT For Region VII RPO
Task Leader: Philip C. Dula
Superfund Contact: Pete Culver
April 22, 1988



EPA

HAZARDOUS
SITE
EVALUATION
DIVISION

Field Investigation Team Zone II

CONTRACT NO.
68-01-7347

Note
4-25-88 Memo
"Recommendations and
HRS Considerations"
To Shelley Postle
5/16/88

ecology and environment, inc.

International Specialists in the Environment

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APPENDICES

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SECTION 1: INTRODUCTION

The Region VII U.S. Environmental Protection Agency (EPA) tasked the Ecology and Environment, Inc., Field Investigation Team (E & E/FIT) through Technical Directive Document (TDD #F-07-8701-15 (Appendix A) to assist the Iowa Department of Natural Resources (IDNR) in evaluating the source of ground water contamination in the Atlantic Public Water Supply (PWS) in Atlantic, Iowa. This assistance was provided by the E & E/FIT as a demonstration of the soil-gas investigation technique. The objectives of this soil-gas survey were to define the areal extent of the ground water plume associated with the tetrachloroethene (PCE) detected in the municipal water supply, and to identify the source(s) of the PCE contamination.

The soil-gas survey was conducted on August 24 through 28, 1987 by a 5-person team. This report details the theory and methodology of the soil-gas investigation, and presents the results of the E & E/FIT investigation. The EPA Site Inspection Form (2070-13) is included as Appendix B.

SECTION 2: SITE DESCRIPTION AND LOCATION

2.1 SITE LOCATION

The city of Atlantic (population 7,789) is located in southwest Iowa approximately 75 miles west of the state capital of Des Moines, and 45 miles northeast of Council Bluffs (Figure 1). Atlantic's public water system is operated and maintained by the Atlantic Municipal Utilities (AMU), which is located at 15 West Third Street. The Atlantic public water system consists of 12 water wells, nine of which are presently on line. The well field is located in the N 1/2, SW 1/4, Section 4, and the SW 1/4, NE 1/4, Sec. 4, T76N, R36W of the Atlantic and Wiota Quadrangles, Cass County, Iowa (Figures 1 and 2) (Ref. 1 and 2).

2.2 SITE DESCRIPTION

The AMU water well field is drilled in the wide, deep, pre-glacial valley of the East Nishnabotna River, which flows southwest across Cass County. The well field is adjacent to Troublesome Creek, a tributary of the Nishnabotna River. The average elevation of the study area is approximately 1,160 feet above mean sea level (MSL) (Figure 2).

2.3 SITE CONTACTS

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Kern Miller, Engineer
Atlantic Municipal Utilities
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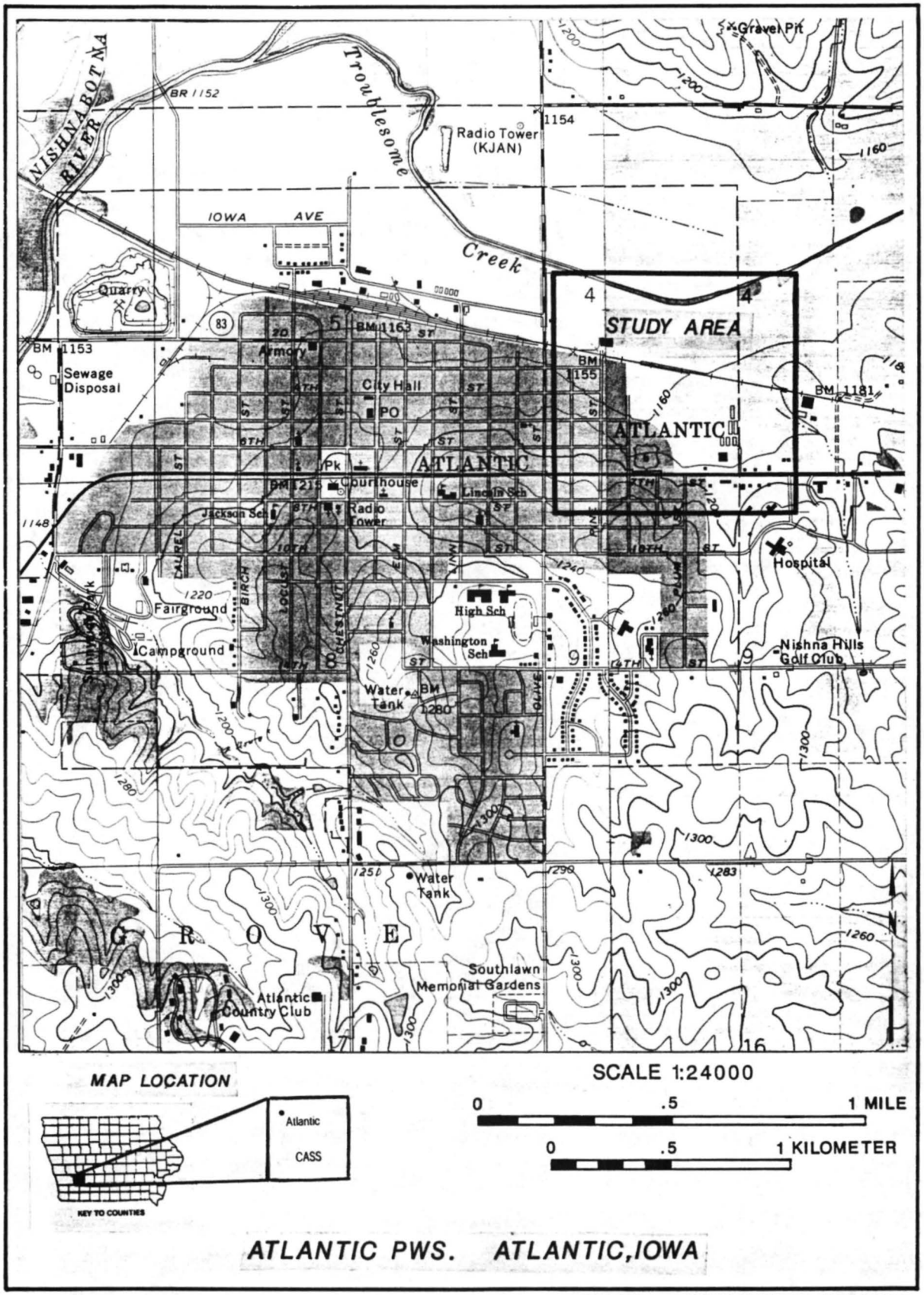


ATLANTIC PWS. ATLANTIC, IOWA

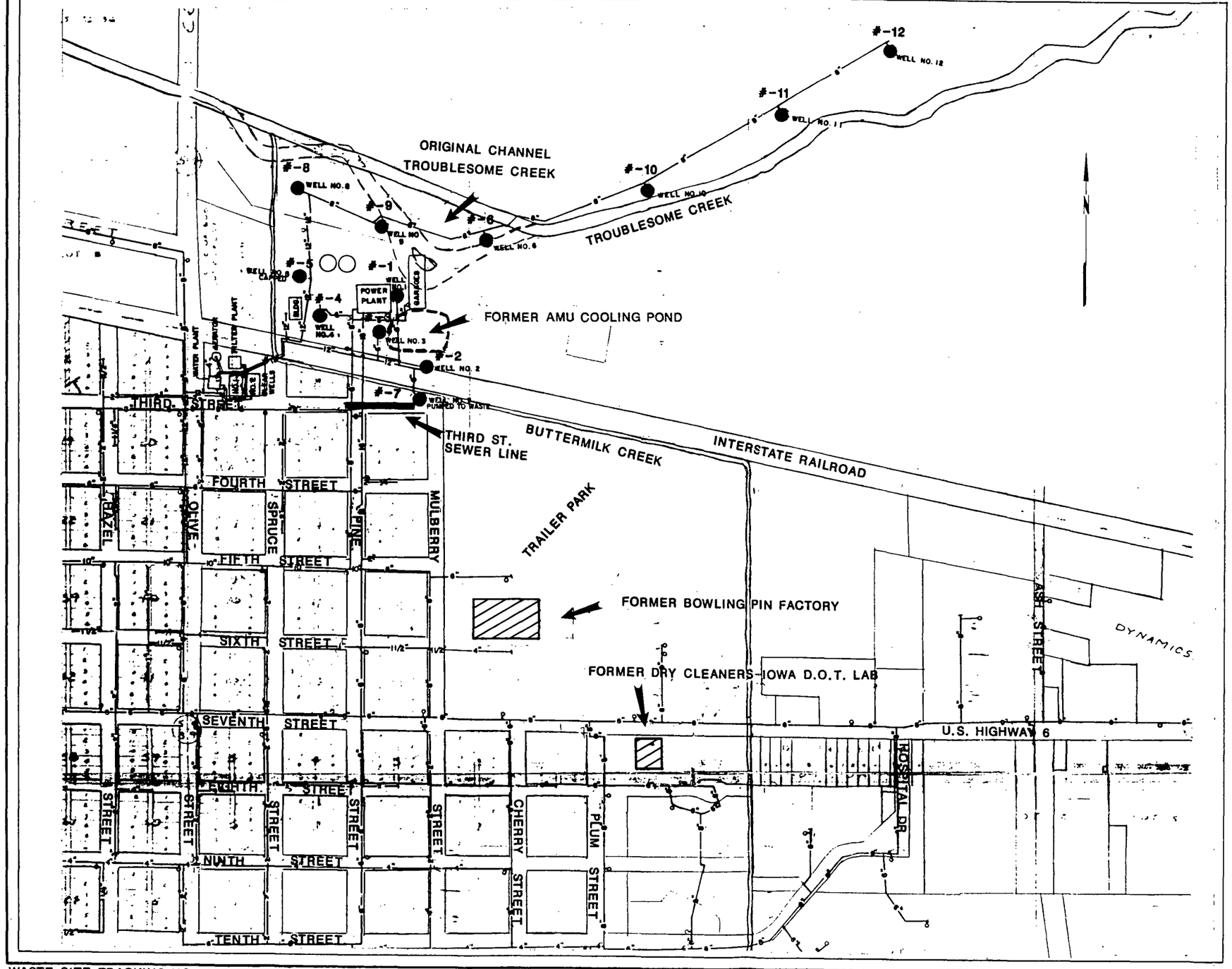
EPA SITE # IA0194

DRAWN BY P.C.DULA 10/87

ECOLOGY & ENVIRONMENT FIT 10/87

SOURCE: USGS 7.5' ATLANTIC, IA QUAD 1966
USGS 7.5' WIOTA, IA QUAD 1966

FIGURE 1: SITE LOCATION



WASTE SITE TRACKING NO.: IA0194
REVISED BY: P.C. DULA

ECOLOGY & ENVIRONMENT FIT JAN. 1988
SOURCE: WATER SYSTEM MAP DRAWN BY KERN MILLER AMU

FIGURE 2: AMU WELL FIELD

William "Burt" Hoeck, Water Manager
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SECTION 3: SITE BACKGROUND

3.1 SITE HISTORY

Tetrachloroethene (PCE) was first detected in AMU well #7 at 170 micrograms/liter (ug/l) in August 1982 during a water quality survey conducted by the Iowa Department of Natural Resources (IDNR). Periodic testing of Atlantic's water wells through June 10, 1987, has consistently shown PCE concentrations ranging from 150 to 260 ug/l in well #7. Additional contaminants detected in well #7, and several of the other municipal wells, are trichloroethane, trans-1,2-dichloroethene, and chloroform. Table 1 illustrates the sampling results chronologically from August 1982 through June 1987. The most recent sampling of the AMU wells was conducted on June 10, 1987, by IDNR, and was observed by E & E/FIT. Eleven of the city's 12 wells were sampled. Well #5 could not be sampled because it is permanently capped. This is due to the construction of an electric substation which now exists at this well location. Well #12 was installed in August 1977 to replace well #5.

PCE contamination has been detected in wells #2, #3, #4, #7, #9, and #10. Wells #3 and #7 have been taken off the water system due to elevated levels of contamination. From August 1982 to January 1986, well #7 was pumped at a rate of 80 gallons per minute (GPM) for 8 to 12 hours per day into Buttermilk Creek, which serves as a drainage ditch for the surrounding area (Figure 3).

Well #7 was shut down for a period of three months from January through March 1986 while city officials sought a remedy for the contaminated well. In April 1986, officials of the IDNR and the AMU decided that well #7 should be pumped continually to Buttermilk Creek at a rate of 80 gpm until further notice.

In November, 1987, IDNR and AMU officials discussed further remedial measures for well #7. IDNR and AMU officials concluded that well #7 should be pumped continually to the sanitary sewer system. The outflow from well #7 was rerouted via underground pipe to the 3rd Street sanitary sewer line located approximately 150 feet southwest of the well. The well commenced pumping at a continous rate of 80 gpm to the sanitary sewer system in December 1987. The discharge from well #7 is routed via this system to the AMU waste water collection system for treatment (Ref. 22).

TABLE-1 GROUND WATER, SURFACE WATER, AND SEDIMENT SAMPLE RESULTS 8/82-6/87
ATLANTIC PUBLIC WATER SUPPLY ATLANTIC,IOWA

SAMPLE TYPE	WELL#/SAMPLE#	TRICHLOROETHANE								TETRACHLOROETHENE (PCE)								CHLOROFORM								1,2-DICHLOROETHANE							
		8-82	9-82	5-83	8-84	1-86	3-86	6-86	6-87	8-82	9-82	5-83	8-84	1-86	3-86	6-86	6-87	8-82	9-82	5-83	8-84	1-86	3-86	6-86	6-87	8-82	9-82	5-83	8-84	1-86	3-86	6-86	6-87
Ground Water A.M.U. Well Field Results in ug/l	#1	<1	*	<1	<1	<1	<1	<1	<1	<1	*	<1	<1	<1	<1	<1	<1	NR	*	NR	NR	NR	NR	NR	<1	NR	*	NR	NR	NR	NR	NR	<1
	#2	<1	*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	NR	*	NR	<1	NR	NR	NR	<1	NR	*	NR	<1	NR	NR	NR	<1
	#3	<1	*	<1	<1	<1	<1	<1	<1	1	1	<1	2	4	<1	4	1	NR	*	NR	<1	NR	NR	<1	1	NR	*	NR	<1	NR	NR	<1	<1
	#4	*	*	*	*	*	*	*	1	*	*	*	*	*	*	*	3	*	*	*	*	*	*	*	<1	*	*	*	*	*	*	*	<1
	#5	WELL IS CAPPED AND ABANDONED								WELL IS CAPPED AND ABANDONED								WELL IS CAPPED AND ABANDONED								WELL IS CAPPED AND ABANDONED							
	#6	<1	*	<1	<1	<1	<1	<1	<1	<1	*	<1	<1	<1	<1	<1	<1	NR	*	NR	NR	NR	NR	NR	<1	NR	*	NR	NR	NR	NR	NR	<1
	#7	<1	NR	<1	2	1.1	<1	1	1	170	224	223	260	190	160	200	150	NR	NR	NR	<1	NR	NR	<1	<1	NR	NR	NR	<1	NR	NR	<1	1
	#8	<1	*	<1	<1	<1	<1	<1	<1	<1	*	<1	<1	<1	<1	<1	2	NR	*	NR	<1	NR	NR	NR	<1	NR	*	NR	<1	NR	NR	NR	<1
	#9	<1	*	<1	<1	<1	<1	<1	<1	<1	*	<1	<1	<1	<1	<1	1	NR	*	NR	<1	NR	NR	NR	<1	NR	*	NR	<1	NR	NR	NR	<1
	#10	<1	*	<1	<1	<1	<1	<1	<1	<1	*	<1	<1	<1	<1	<1	<1	NR	*	NR	NR	NR	NR	NR	<1	NR	*	NR	NR	NR	NR	NR	<1
	#11	<1	*	<1	<1	<1	<1	<1	<1	<1	*	<1	<1	<1	<1	<1	<1	NR	*	NR	NR	NR	NR	NR	<1	NR	*	NR	NR	NR	NR	NR	<1
	#12	<1	*	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	NR	*	NR	<1	NR	NR	NR	<1	NR	*	NR	<1	NR	NR	NR	<1
Surface Water Buttermilk Creek Down Gradient of Well #7 Results in ug/l	001	*	*	*	*	*	*	*	1	*	*	*	*	*	*	*	31	*	*	*	*	*	*	*	<1	*	*	*	*	*	*	*	<1
Sediment Buttermilk Creek Down Gradient Well #7 Results in ug/kg	002	*	*	*	*	*	*	*	5	*	*	*	*	*	*	*	<5	*	*	*	*	*	*	*	<5	*	*	*	*	*	*	*	<5

* = Sample Not Collected

NR = Results Not Reported

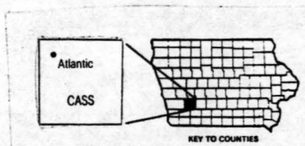
(190) = University of Iowa Hygenic Lab data transmittal reported a PCE concentration of 1900 ug/l. This is believed to be in error by one order of magnitude. Correct figure should be 190 ug/l.

ecology and environment, inc.
CLOVERLEAF BUILDING 3, 6405 METCALF
OVERLAND PARK, KANSAS 66202

EXPLANATION

▲1 WELL

ATLANTIC
PUBLIC WATER SUPPLY
ATLANTIC, IOWA



SCALE

0 330 660

FEET

WASTE SITE TRACKING NO.: IA0194
PREPARED BY: C. WILLIAMS

ECOLOGY & ENVIRONMENT FIT JAN. 1988
SOURCE: CASS COUNTY, TAX ASSESSORS FILES

FIGURE 3: AERIAL PHOTO OF SOIL-GAS STUDY AREA

3.2 POTENTIAL SOURCES

Several potential sources of contamination were targeted for investigation during the Soil-Gas Survey. These sources were:

- **AMU Power Plant** - The Atlantic Power Plant may have had, at some time in the past, a disposal area on site. Well logs from wells #3 and #5 indicate fill material in the upper ten feet. Solvents may have been introduced to a cooling pond which existed on the the AMU property from 1945 to 1960. Solvents introduced to the pond would have leached to the shallow aquifer (Figure 2). Richard Stevens, Superintendent of AMU and William Hoeck, Water Manager of AMU, said that they firmly believe no chemical or solid wastes have ever been disposed of on the AMU grounds (Ref. 3).

- **Commercial Sites** - Several gas stations, auto service, and repair facilities are located within the drainage basin area of the site (well field). Several former commercial operations are of special interest because they were located hydrologically upgradient and in close proximity to the contaminated wells (Figure 2). A dry cleaning facility operated at 1205 East Seventh Street approximately 25 years ago. The same facility was used from 1960 to 1974 by Shrauger Appliance as an appliance retailing facility. The Iowa Department of Transportation (IDOT) leased the site as a materials testing laboratory in 1974. The IDOT relocated its operation in March 1986 to a site east of Atlantic on East Highway 6. It is suspected that solvents were routinely used in both the dry cleaning business operations and by the IDOT. (Figures 2 and 3). A Hardee's restaurant is now located 250 feet east of the former IDOT lab facility. This property located at 1309 East Seventh Street was previously the site of a Town and Country Drive Inn (1976-1985) and the A&W Drive Inn (1970-1976). Before 1970 this property was vacant.

  A bowling pin refinishing factory operated in Atlantic for several years in the area now occupied by the Sycamore Village Trailer Park, which is adjacent to Seventh Street and Mulberry

Street. The factory was consumed by fire several years ago. The exact dates of operation and ultimate destruction of the factory are presently unknown. It is believed that solvents were utilized in this factory's operation (Figures 2 and 3).

- **Third Street Sewer Line** - A sewer line is located 50 feet south of well #7 and is oriented east-west paralleling the southern boundary of Third Street (Figure 2). This sewer line may serve as a conduit for contaminant migration, if a source exists west of well #7.

- **Railroad** - The Iowa Interstate Railroad (IIRR) operates a line within the northern city limits of Atlantic. The railroad line crosses the southern end of the water well field. Well #7 is situated south of the tracks. The remaining 11 wells are north of the tracks (Figures 2 and 3). The railroad line was formerly operated by the Chicago, Rock Island, and Pacific Railway (CRI&P). Richard Stevens, AMU Superintendent, knows of three spills which occurred along this line while during the period of CRI&P ownership. According to officials of the IIRR, records of these spills have been misplaced. It is believed that these spills occurred before 1969. Two of these spills are reported to have involved a load of automobiles and a molasses spill (Ref. 3).

3.3 WASTE CHARACTERISTICS

Tetrachloroethene (PCE, perchloroethylene, PERC, tetrachloroethylene, and 1,1,2,2-tetrachloroethylene) is used as a dry cleaning solvent; textile scouring solvent; dried vegetable fumigant; rug and upholstery cleaner; stain, spot, and rust remover; printing ink ingredient; heat transfer media ingredient; metal degreaser; and as a chemical intermediate in the production of other organic compounds (Ref. 4). Table 2 presents the physical properties of PCE and other selected volatile organic compounds (Ref. 4).

TABLE 2
Properties of Selected Volatile Organic Compounds
Atlantic PWS, Atlantic, Iowa
E & E/FIT, August 1987

Compound	Formula	Molecular Weight (gm/mol)	Density (gm/ml)	Boiling Point °C Atm.	Solubility mg/L	Vapor Pressure mm Hg	Henry's Constant* ($Atm-m^3$/mole)	Octanol/Water Partition Coefficient
Trichloroethylene	$CHCl=CCl_2$	131.4	1.46	87.0	1100	74.0	$9.8X10^{-3}$	2.29
Tetrachloroethylene	$CCl_2=CCl_2$	165.8	1.62	121.0	140	18.6	$19.8X10^{-3}$	2.60
Vinyl Chloride	$CH_2=CHCl$	62.5	0.92	-13.9	2700	760.0	6.4	N.D.
1,2-Dichloroethane	CH_2ClCH_2Cl	99.0	1.24	87.0	8700	82.0	$1.1X10^{-3}$	N.D.
1,1,1-Trichloroethane	CH_3CCl_3	133.4	1.34	74.0	720	124.0	$7.2X10^{-3}$	2.49
Carbon tetrachloride	CCl_4	153.8	1.59	77.0	800	113.0	$23.2X10^{-3}$	2.72
Chloroform	$CHCl_3$	119.4	1.49	61.0	8200	192.0	$30.6X10^{-3}$	1.95

N.D. = Not Determined

* Temperature 20°C

Ref. 4

PCE vaporizes readily and, when carried by surface water, a large percentage of PCE is lost through evaporation. It will generally leach through soils of low (<0.1%) organic carbon content. Prolonged exposure of PCE to light accelerates decomposition (Ref. 5). During chlorination water treatment, it can be formed in small quantities (5 ug/l) (Ref. 6).

PCE metabolites bioaccumulate in humans to some degree with continued exposure. High, acute exposure, >200 ppm, results in depression of the central nervous system and transient dysfunction of the liver and kidneys. The National Cancer Institute (NCI) has concluded that PCE is a liver carcinogen in mice but not in rats (Ref. 4). Table 3 presents the projected upper limit for lifetime cancer risks for PCE and related compounds. PCE has been shown to undergo anaeorbic degradation in ground water in the following manner: tetrachloroethylene ⇒⇒ trichloroethylene ⇒⇒ dichloroethylene ⇒⇒ vinyl chloride (Ref. 7).

PCE can be carried up the food chain, though it does not appear to biomagnify or concentrate as it moves up the food chain. It is generally eliminated rapidly from aquatic organisms and does not appear to affect aquatic plants. In view of the relative paucity of data on the long term oral toxicity of PCE, estimates of the effects of chronic oral exposure at low levels cannot be made with confidence. The National Research Council Safe Drinking Water Committee has recommended that studies to produce such information be conducted before final limits in drinking water are established. The EPA has not determined the Maximum Contaminant Level (MCL) for PCE. An MCL range of 10 to 50 ug/l is under consideration.

TABLE 3
Projected Upper Limit Lifetime Cancer Risks for
Indicated Drinking Water Concentrations
Atlantic PWS, Atlantic, Iowa
E & E/FIT, August 1987

Compound	Projected upper limit lifetime cancer risk	Concentrations in drinking water (ug/L) CAG*	NAS**
Trichloroethylene	10^{-4}	280.0	450.0
	10^{-5}	28.0	45.0
	10^{-6}	2.8	4.5
Tetrachloroethylene	10^{-4}	90.0	350.0
	10^{-5}	9.0	35.0
	10^{-6}	0.9	3.5
Carbon tetrachloride	10^{-4}	40.0	450.0
	10^{-5}	4.0	45.0
	10^{-6}	0.4	4.5
1,2-Dichloroethane	10^{-4}	95.0	70.0
	10^{-5}	9.5	7.0
	10^{-6}	0.95	0.7
Vinyl chloride	10^{-4}	200.0	100.0
	10^{-5}	20.0	10.0
	10^{-6}	2.0	1.0

(Ref. 4)
Assumes: Lifetime exposure of 70 years by 70 kg adult with a consumption of 2 liters of water per day. Nonthreshold toxicity mechanism is operative at low doses in humans. Assimilation in humans at low doses is the same as animals at experimental doses. Interspecies (animal/human) dose scaling is proportional to body surface area.

* CAG - EPA Carcinogen Assessment Group
** NAS - National Academy of Sciences Safe Drinking Water Committee

SECTION 4: PHYSICAL SETTING

4.1 CLIMATOLOGY

The Cass County climate has been classified as continental. Changes in weather are frequent and can be pronounced. This is due mainly to the proximity of the county near two major storm tracks -- one from the southwest and one from the northwest.

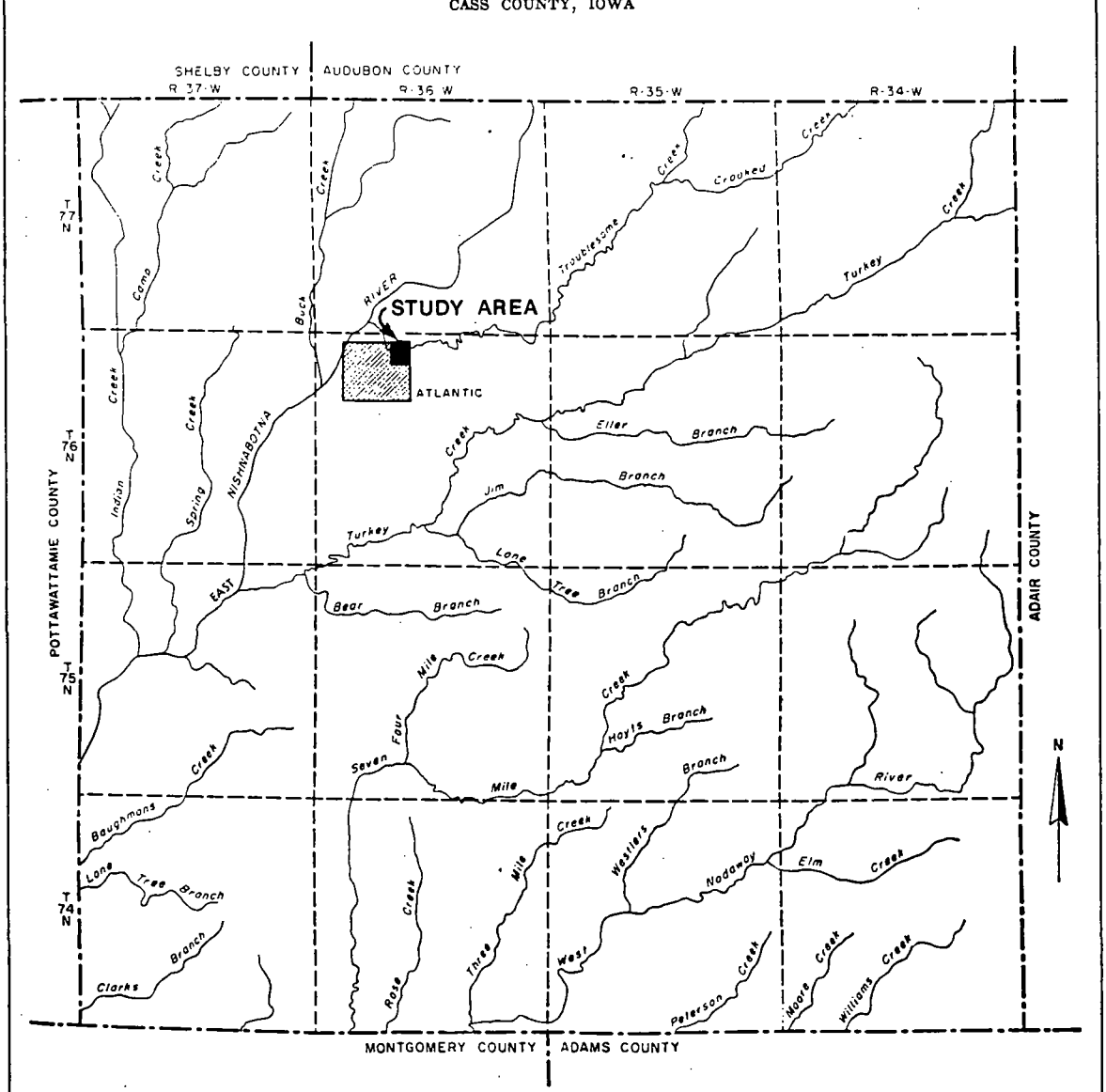
Summers are warm and winters are cold, but prolonged periods of extreme heat and intense cold are rare. Temperatures range from 90°F to -20°F. Sunny skies and southerly winds prevail in summer. Winters are somewhat cloudy and the prevailing winds are from the northwest (Ref. 8).

About 73 percent of the annual precipitation falls from April through September. On the average, rain is most abundant in June and August. The average yearly rainfall recorded in Cass County from 1980 to 1986 was 39.1 inches (Ref. 8 and 9). The average snowfall received in the county is about 30 inches a year. From 1980 to 1986 the average winter snowfall totaled 25.1 inches (Ref. 9). Climatic records for Cass County from January 1980 to August 1987 are presented in Appendix C.

4.2 TOPOGRAPHY AND DRAINAGE

The city of Atlantic is part of an extensive glacial drift plain, which is mantled with loess. The area slopes gently toward the southwest and is cut by streams that flow south and southwest. All of the valleys of the larger streams have a well developed flood plain that is bordered by an older flood plain, or second bottom.

The chief streams dissecting the county are the East Nishnabotna River and Turkey, Troublesome, and Indian creeks. The East Nishnabotna River borders the city of Atlantic to the west and northwest. Troublesome Creek, a tributary to the East Nishnabotna, borders the city to the north-northeast (Figure 4).



ATLANTIC PUBLIC WATER SUPPLY
ATLANTIC, IOWA

WASTE SITE TRACKING NO.: IA0194
PREPARED BY: C. WILLIAMS

ECOLOGY & ENVIRONMENT FIT JAN. 1988
SOURCE: REVISED FROM SOIL SURVEY OF CASS CO., IOWA 1969

FIGURE 4: DRAINAGE PATTERN OF CASS COUNTY, IOWA

The Atlantic PWS well field is situated in the well developed, mature flood plain of Troublesome Creek. The flow direction of Troublesome Creek and several of its tributaries (drainage ditches) have been altered in the site area to reduce seasonal flooding. Troublesome Creek, located 800 feet north of well #7, was rerouted in the mid 1940s by straightening its southern meander which was adjacent to the former AMU cooling pond. The banks of Troublesome Creek are now located approximately 500 feet north of their original location (Figure 2). Buttermilk Creek, located 25 feet north of well #7, has been altered to flow west for 2,000 feet near a railroad embankment of the Iowa Interstate Railroad. Buttermilk Creek resumes a northerly flow direction to Troublesome Creek through the AMU grounds (Figure 2).

The topographic expression in the area of the site investigation is a broad, near level flood plain (0 to 3% slopes) bordering Troublesome Creek to the north and south. The gradient of the flood plain and creek channel through the site area to the confluence of Troublesome Creek and the East Nishnabotna River is to the southwest with a 2% slope or an approximate decrease in elevation of 10 feet per mile. Rolling hills border the flood plain, dipping north-northwest from the south and south-southwest from the north. The average elevation in the study area is 1,160 feet MSL (Figure 1).

4.3 GEOLOGY

4.3.1 Soils

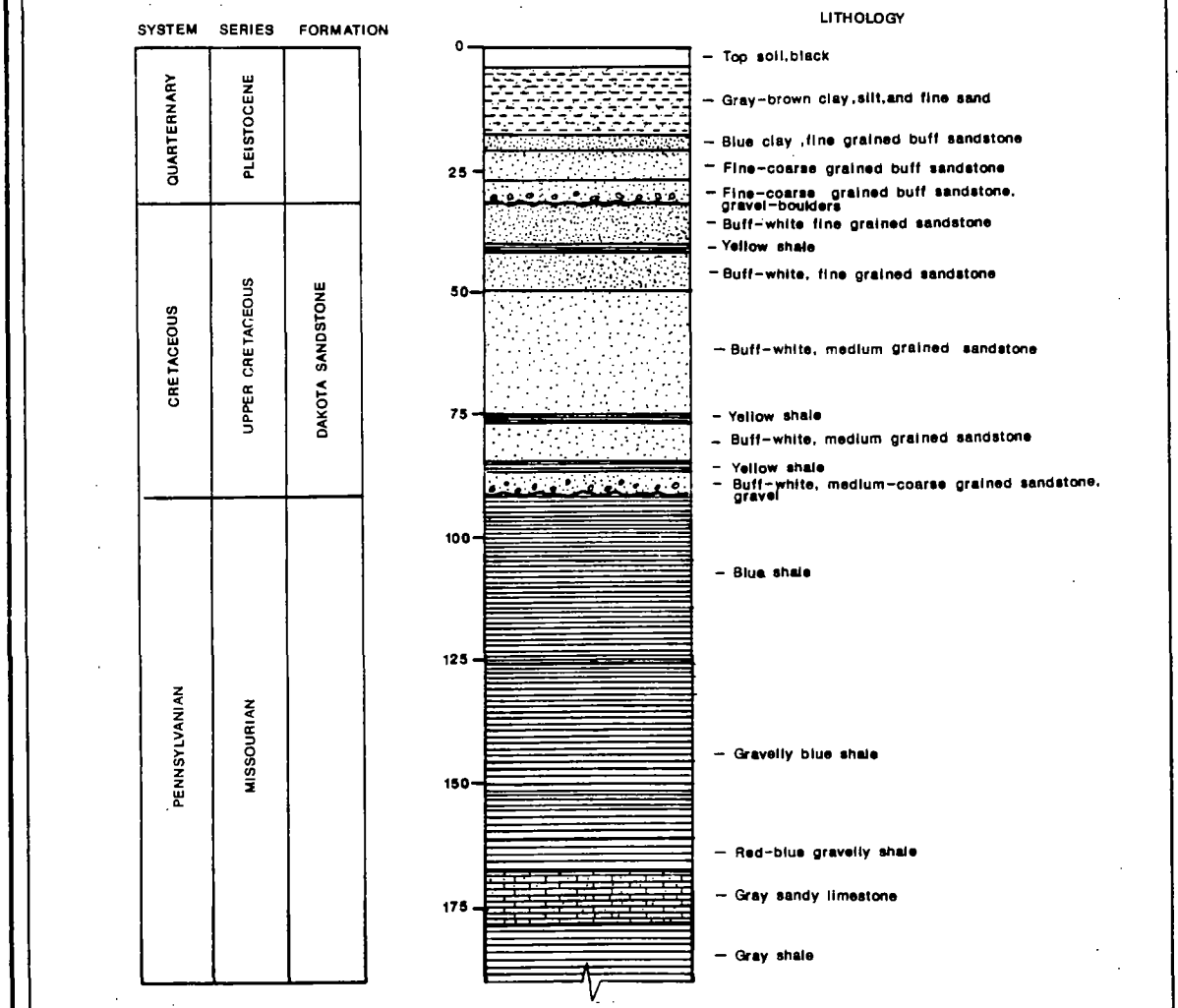
Ten soil types have been mapped in the immediate and surrounding area of the Atlantic PWS site. The units are: The Bremer silty clay loam; the Colo silty clay loam; the Judson silt loam; the Marshall silty clay loam, with 9 to 14 slopes; the bench forming Marshall silty clay loam; the Nevin silty clay loam; the Nodaway silt loam; the Zook silt loam; the Zook silty clay loam; and the Wabash silty clay loam (Figure 5, Ref. 8).

The soil types mapped in northeast Atlantic are classified in specific soil associations. The Marshall-Bremer-Nevin Association is composed of nearly level, well drained to poorly drained soils on benches. The Wabash soil is also associated with this group. These soils are formed from loess and alluvium. The Nodaway-Zook-Colo Association is composed of nearly level, moderately well drained to poorly drained soils on bottom lands. The Wabash soil is also found in minor amounts with this group. The Judson silt loam has 0 to 2% slopes and generally makes up alluvial fans below upland drainageways. The permeability range within these soils is 0.8 to 2.5 inches/hr (0.6×10^{-6} to 1.8×10^{-3} cm/sec) (Ref. 8).

4.3.2 Stratigraphy

The stratigraphic units represented in the upper 200 feet of the subsurface in the northeastern area of Atlantic, Iowa, are presented in Figure 6. The geologic section presented in this figure is derived from well logs of the AMU water wells and from the Atlantic Coal and Mining Company test boring drilled in 1888 to a depth of 1,310 feet (Ref. 10). The stratigraphic units presented are (from youngest to oldest):

- Quaternary System - The Pleistocene sediments present in the area of the site investigation are approximately 30 to 40 feet thick. Pleistocene-age sediments consist of alluvium, loess, and glacial drift deposits. The alluvial deposits consist of sediments laid down along major streams and narrow upland drainageways. The texture of the alluvium varies widely as it is dependent on the source material and the time it was deposited. The alluvial material is made up of sand and gravels alternating with clay. Loess, which was deposited by wind, is a gritless loam intermediate with particles sized between fine sand and clay. Its loose texture makes it highly permeable. The surficial, yellow loess is usually underlain by a blue-gray loess or a reddish loam, intermediate in texture and color between loess and the red residual clays or the red weathered clays of the drift on which it



KEY

SHALE
CLAY
LIMESTONE
GRAVEL
SANDSTONE

ATLANTIC PUBLIC WATER SUPPLY
ATLANTIC, IOWA

VERTICAL SCALE: .7" = 25'

WASTE SITE TRACKING NO.: IA0194
DRAWN BY: P.C. DULA

ECOLOGY & ENVIRONMENT FIT JAN. 1988
SOURCE: AMU WATER WELL LOGS AND REF. 6

FIGURE 6: GENERALIZED STRATIGRAPHIC SECTION

rests. The glacial till or drift deposits consist principally of sediments deposited during the Kansas glaciation, which was the second glaciation of the Pleistocene-age. The deposits of this second ice invasion consist largely of a calcareous clayey till containing many small pebbles and sparse boulders. Little stratified material is observed or associated with the Kansan drift. The till is blue-gray in color where unweathered and reddish in color when oxidized.

- The Upper Cretaceous sediments present in the Atlantic area are represented by the Dakota Sandstone. The Dakota Sandstone unconformably underlies the Pleistocene (Kansan drift) and overlies the Paleozoic formations with pronounced unconformities. The Dakota is a coarse-grained ferruginous sandstone, very poorly cemented and locally interbedded with seams of clay. In places it contains beds of very fine, white to buff, discontinuous sand. The Dakota is approximately 40 to 60 feet thick in the AMU well field area.

- Bedrock in the Atlantic, Iowa, area is composed of shale and limestone of the Carboniferous period and belongs to the Missouri Series of Pennsylvanian age. These rocks are exposed in the valley of the East Nishnabotna River. The sediments of the Missourian series are chiefly calcarcous gray-blue-red shales interbedded with heavy and persistent beds of gray-blue limestone. The Pennsylvanian-age sediments underlying Atlantic, Iowa, are approximately 725 feet thick. The upper 80 feet consists of red to blue shale with interbedded gravels. The first limestone beds encountered occur below this shale interval and are approximately 15 feet thick (Ref. 8 and 10).

4.4 HYDROGEOLOGY

The water-bearing units utilized in Cass County are the alluvial sands and gravels, loess sands, and drift sands of the Pleistocene, Upper Cretaceous Dakota Sandstone, and Pennsylvanian limestone (Missourian stage).

The Atlantic PWS receives its supply of water from the 50 to 100 foot deep sands and gravels that fill the valley bottoms of the East Nishnabotna River and Troublesome Creek and from the Dakota Sandstone. These sands and gravels afford an inexhaustable water supply at depths of 20 to 100 feet. The water-bearing bed lies 50 to 80 feet below the surface and consists of an angular-grained, white sand with some gravel. Above this bed are many layers of clayey silt alternating with beds of sand and gravel, some of which are water bearing. The aquifers of concern in the study area, the Pleistocene glacial drift and the Dakota Sandstone, are unconfined aquifers that are hydrologically connected. Observed ground water flow direction is to the northwest towards Troublesome Creek and the East Nishnabotna River. Pump rates from wells in this shallow aquifer range from 300 to 500 gallons per minutes (gpm). The observed static water level in the wells is approximately 14 feet but this level varies with weather and rainfall. The wells respond within 24 hours to heavy rainfall or rise of Troublesome Creek and the East Nishnabotna River (Ref. 10 and 11). Test information and well logs of several of the AMU wells are presented in Appendix D.

The first aquiclude encountered beneath the site and well field area are the impermeable, calcareous, gray-blue-red shales belonging to the Missourian Series of Pennsylvanian-age. These shales are encountered at a depth of 85 to 90 feet and are approximately 80 feet in thickness. The Pennsylvanian sediments underlying Atlantic, Iowa are approximately 725 feet thick and consist predominatly of calcareous shales interbedded with limestone. The first limestone beds are encountered at a depth of 170 feet (Ref. 10)

SECTION 5: FIELD ACTIVITIES

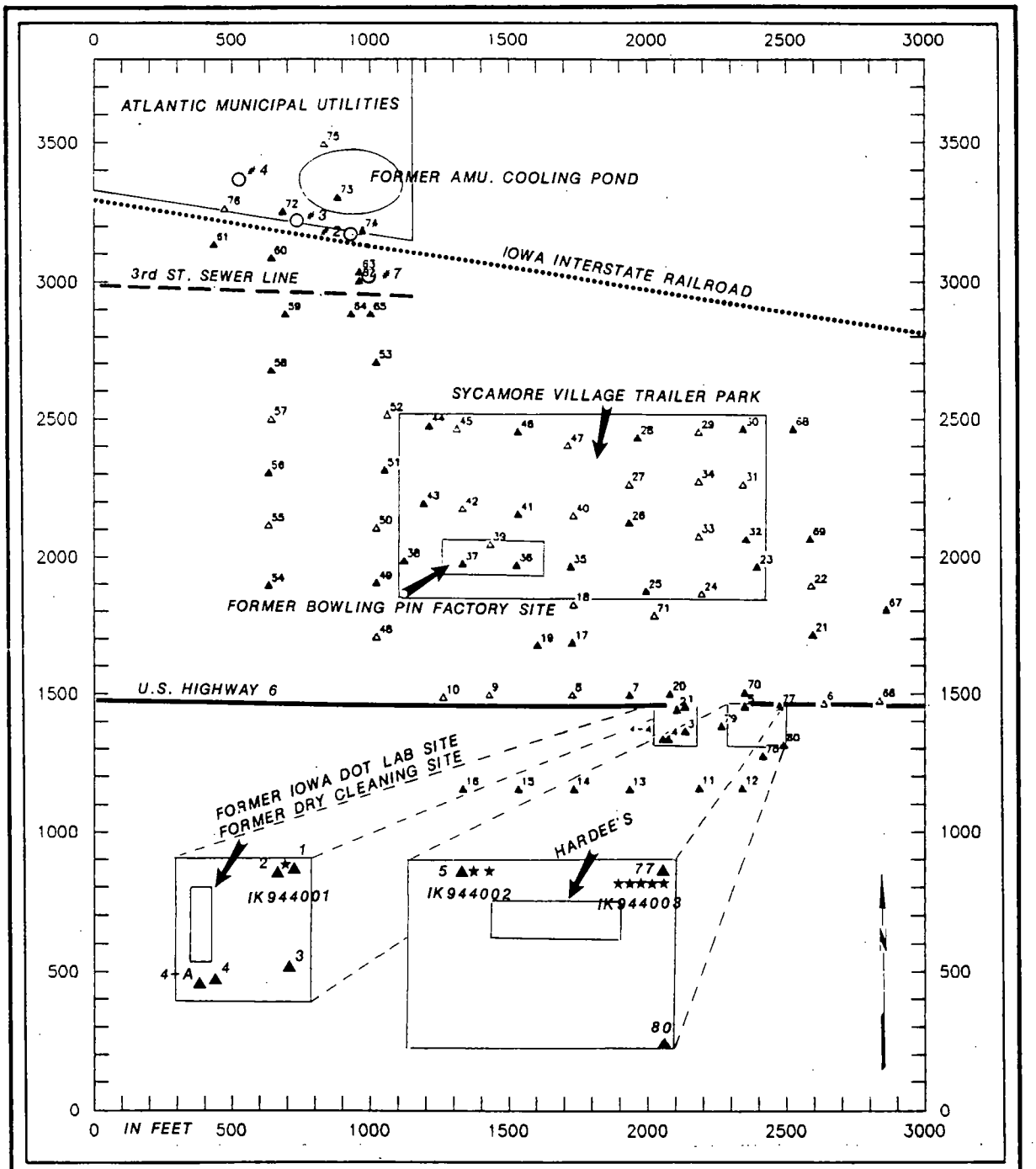
5.1 SOIL-GAS SURVEY

The Atlantic PWS soil-gas investigation was conducted the week of August 23, 1987. A soil-gas sample grid consisting of 75 points was initially laid out over the study area. The spacing interval between sample points was 200 feet. Initial sample collection was concentrated at the former Iowa Department of Transportation (IDOT) Lab/Dry Cleaning facility location. Sample collection proceeded from this location, north-northwest in the direction of ground water flow toward wells #2, #3, #4, and #7. Additional potential contaminant sources were evaluated as the soil-gas survey proceeded in this direction. These potential sources were the former bowling pin factory site, located in the Sycamore Village Trailer Park, the Third Street sewer line, and the former AMU cooling pond location (Figures 2 and 7).

Sampling locations were deleted or added as the soil-gas sampling progressed through the study area. As the contaminant plume boundary was delineated by negative sample results, perimeter sample locations beyond the plume boundary were not pursued. The number of sample points were further reduced by electing to revise the sample spacing to 400 feet through the Sycamore Village Trailer Park and adjacent residential areas. Additional sample locations were added as in-fill sample points in areas where elevated levels of PCE were detected. Soil-gas samples were collected at a depth of 5 to 6 feet. A final sample grid of 81 points was laid out; of these, 55 points were sampled and analyzed. Figure 7 depicts the 81 points of the sample grid and the location of the 55 soil-gas samples collected.

5.1.1 Soil-Gas Theory

The soil-gas method is based on the theory that volatile organic pollutants evaporate out of ground water (phreatic zone) into the available pore space in the overlying sediments and migrate upward by molecular diffusion. Their tendency to escape from the ground water into the soil-gas is a function of their concentration in the phreatic



ATLANTIC PUBLIC WATER SUPPLY
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○ MUNICIPAL WATER WELL

★ SOIL SAMPLE LOCATION IK944
STARS INDICATE NUMBER OF
ALIQUATS PER SAMPLE

△ GRIDDED SOIL-GAS SAMPLE LOCATION
SAMPLE NOT TAKEN

▲ SOIL-GAS SAMPLE LOCATION

0' 250' 500' 1000' 1500'

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FIGURE 7: SOIL-GAS SAMPLE AND SOIL SAMPLE LOCATIONS

zone, aqueous solubility, and vapor pressure. Contaminated ground water acts as a source and the above ground atmosphere as a sink. This establishes a contaminant concentration gradient in the soil-gas that allows for a vertical flux of contaminants from the water table to the ground surface.

Ideally, the concentration of the contaminant at any given depth in the soil-gas is a function of its concentration in the phreatic zone. In practice, the concentration gradient between the water table and ground surface in the soil-gas may be distorted by hydrologic and geologic variables such as perched water or other impermeable materials. However, the geologic and hydrologic variables seldom distort the soil-gas distribution sufficiently to preclude an approximation of the ground water contamination. Diffusion of contaminants will generally occur around geologic and hydrologic barriers unless they are of great lateral extent compared to the area of the plume. The principal parameters that enhance diffusive movement of volatile contaminants are high air porosity and low soil moisture. Diffusion occurs most readily through sand and gravel-type mediums (Ref. 12).

5.1.2 Soil-Gas Field Methods

The soil-gas contaminant investigation method is used to detect volatile chemicals such as industrial solvents, cleaning fluids, and petroleum products, by searching for their vapors in shallow soil-gas. The target compound of the Atlantic investigation was tetrachloroethene (PCE). The sample acquisition technique used by E & E/FIT consists of pumping a small amount of soil-gas (10 to 20 liters) from the shallow subsurface through a hollow probe. The probe is connected to 8 feet of black iron extender pipe and driven 5 to 6 feet into the subsurface. The EPA's Central Mining Equipment (CME) model 45 drill rig was used to hydraulically drive the probe and extender pipe.

When the soil-gas probe is in position at the designated subsurface interval, the extender pipe is coupled with a "t" fitting to which the soil-gas collection apparatus is connected (Figure 8). An

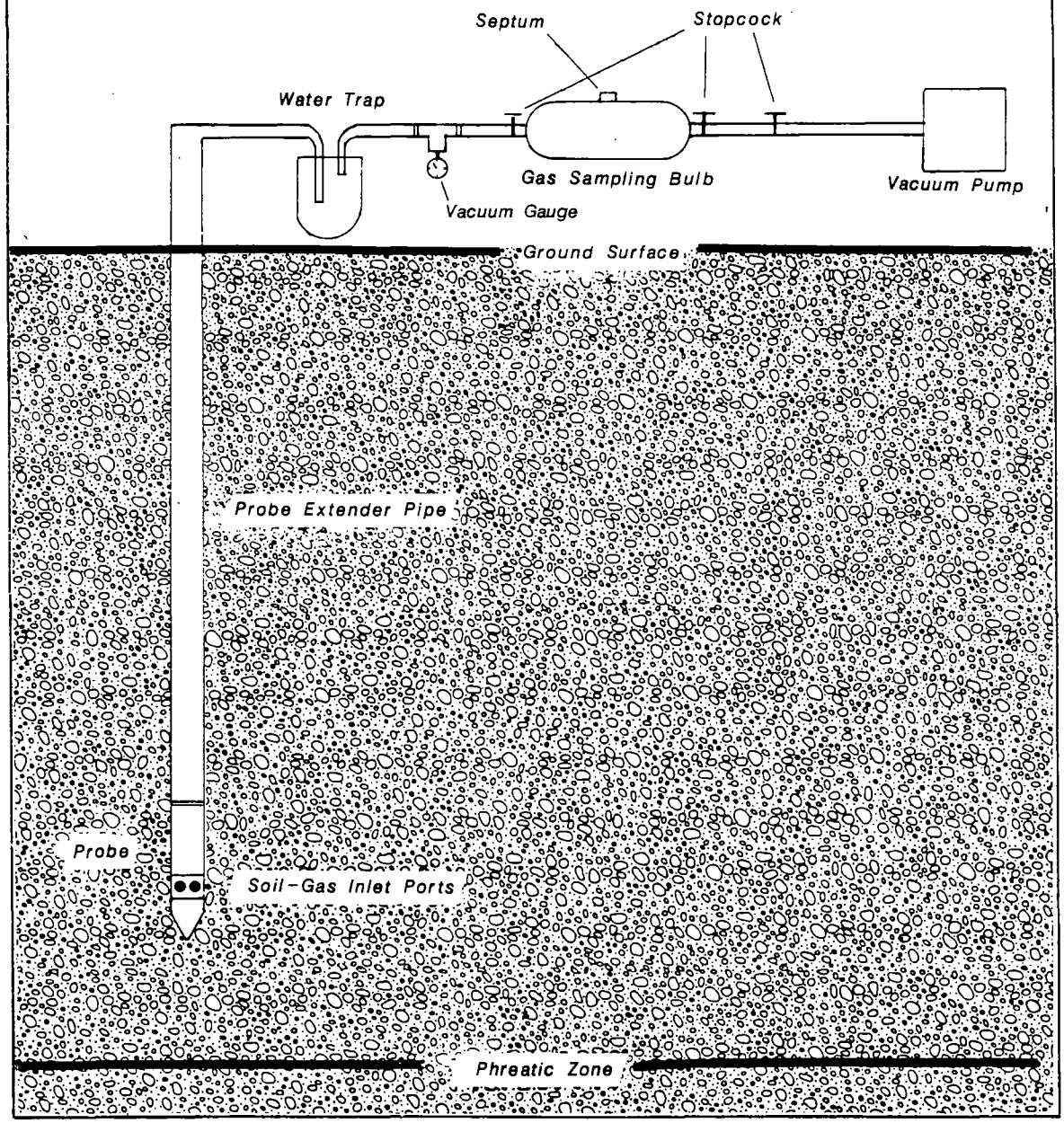

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FIGURE 8: SOIL-GAS ANALYSIS SET-UP

electric pump is used to purge the system of ambient air and to create a vacuum in the system. Once a vacuum has been established in the system, a value on the outtake side of the collection bulb is closed, creating the pressure-concentration gradient necessary for diffusion to occur. The vacuum gauge is monitored until the system re-establishes normal atmospheric pressure. The intake value is then closed, isolating the sample from the system. The collection bulb is removed and transported to the mobile lab for analysis.

This technique provides positive purging of ambient air from the soil-gas collection system, decreasing the chances of sample dilution and/or contamination from atmospheric air. In the event that a vacuum could not be established at a particular sample location, it was noted in the logbook and a sample was collected after 3 to 5 liters of air had been purged.

5.1.3 Soil-Gas Analysis Procedures

An Analytical Instrument Development, Inc. (AID) Model 511 portable gas chromatograph (GC) equipped with a tritium electron capture detector and a 6-foot by 1/8-inch stainless steel column was used to analyze soil-gas samples for PCE (Appendix E). Instrument calibration was performed before injecting soil-gas samples. Calibration was accomplished by injecting known masses of PCE standard into the GC and measuring the corresponding instrument response. A calibration curve was constructed by either plotting the data or performing a linear regression analysis of the data. A minimum of three injections for each standard mass were made.

Soil-gas samples (unknown) were injected into the GC (after calibration) for analysis. The instrument response for the unknown was compared to the standardized instrument response to determine the mass of unknown injected. The mass per liter of sample was then calculated and reported as micrograms of PCE per liter of soil-gas.

The volume of soil-gas injected varied to maintain the response in the linear range of the instrument. The largest sensitivity was 0.001 micrograms of PCE per liter of soil-gas. The minimum levels reported were established at three times the measured background concentrations.

5.2 SOIL SAMPLES

A total of three soil samples (Figure 7) were collected using a hollow steel soil corer. These samples were collected from hot spots identified by the soil-gas survey, to determine PCE concentrations in the upper soil horizon. Sample series number IK994 was assigned to this activity. Sample 001 was collected at soil-gas sample location 001 located 75 feet northeast of the former IDOT Lab facility. The sample was collected from a depth interval of 4 to 5 feet and consisted of a dark-brown to gray-black argillaceous soil. Sample 002 was collected at soil-gas sample location 005 located 30 feet north of the northwest corner of the Hardee's Restaurant. The sample consisted of two aliquots spaced 5 feet apart, each of which was collected at a depth interval of 2 to 3 feet. The sample consisted of a dark-brown, silty to sandy soil. Sample 003 was collected at soil-gas sample location 077 located 30 feet north of the northeast corner of the Hardee's Restaurant. The sample consisted of five aliquots spaced 5 feet apart, each of which was collected at a depth interval of 1 to 4 feet. The sample consisted of a dark-brown to light-gray, silty to sandy soil (Figure 7).

All samples were homogenized in aluminum pans and placed in the appropriate sample containers. Soil samples were delivered to the EPA Region VII Lab for VOAs, BNAs, and pesticides analysis (Table 4). Standard EPA sample preparation, packaging, and delivery procedures were observed.

5.3 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

E & E/FIT soil-gas investigation procedures were conducted under strict sampling protocol. The iron soil-gas probes were thoroughly decontaminated between each use to eliminate the possibility of cross contamination. Decontamination consisted of several washes and rinses with deionized water and steam cleaning. The soil-gas collection system was checked continually for leaks and was subjected to periodic contamination checks by running system blanks. Glass syringes and glass soil-gas collection bulbs are purged with P-5 carrier gas (argon 95%, methane 5%) and baked out between each probe location sample.

TABLE 4
SOIL SAMPLE SUMMARY
Atlantic PWS, Atlantic, Iowa
E & E/FIT, August, 1987
Sample Series IK994

Sample	Location	Depth (feet)	Aliquots	Description
001	75 Ft. N of Former IDOT Lab Facility	4-5	1	Dark-brown to gray-black, argillaceous soil
002	30 Ft. N of NW Corner of Hardee's Restaurant	2-3	2	Dark-brown, silty to sandy soil
003	30 Ft. N of NE Corner of Hardee's Restaurant	1-4	5	Dark-brown to light-gray, silty to sandy soil

Note: All samples were submitted for VOA, BNA, and pesticides analysis. See Figure 7 for sample locations.

Standard EPA and E & E/FIT soil sampling protocols and quality control/assurance guidelines were observed during all soil sampling activities.

5.4 SITE SAFETY

Level D personal protection was employed while conducting the soil-gas investigation and soil sampling activities. Level C protection was available had the action level (1 ppm) for HNu monitoring been exceeded of if obvious hazards had been present. Standard safety procedures and equipment were used during drilling operations. Site safety procedures were strictly enforced.

SECTION 6: ANALYTICAL DATA

6.1 SOIL-GAS

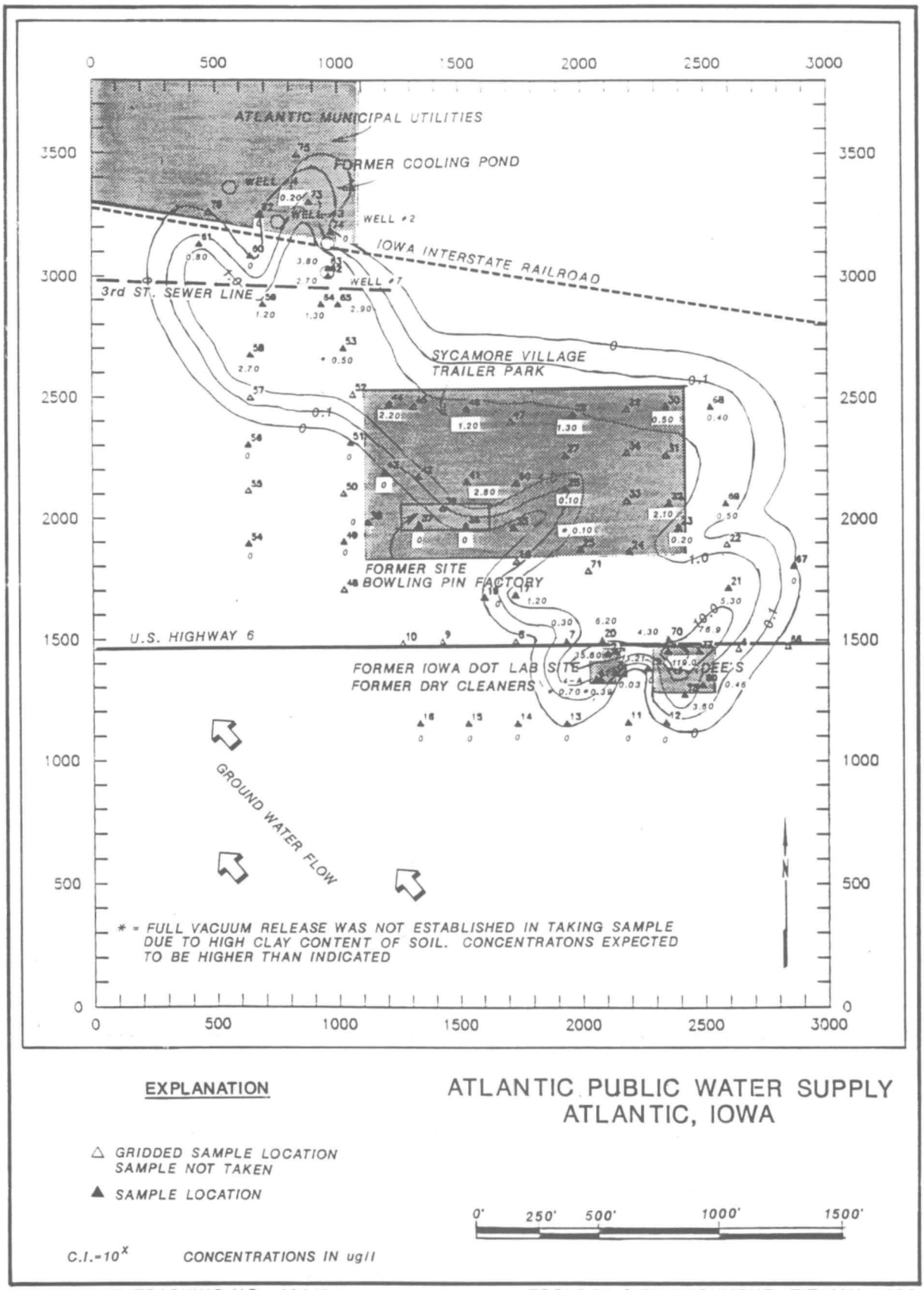
The Atlantic soil-gas investigation successfully delineated a PCE plume with a point source located in the area surrounding sample locations 01, 02, 05, 77 (Figure 9). PCE was detected at these sample locations at 11.21, 35.60, 119 and 76.9 ug/l, respectively. The highest concentration detected, 119 ug/l at sample location 005, was 30 feet north of the Hardee's Restaurant and approximately 200 feet east of the former IDOT lab/former dry cleaning facility (Figure 9).

The orientation of the PCE plume is along a northwest-southwest axis, centered diagonally through the Sycamore Village Trailer Park, following the local ground water flow direction to the northwest. The highest detected PCE concentrations, excluding those detected at the point source, are around the axis of the plume. Other PCE concentrations around the plume axis ranged from 1.20 to 6.20 ug/l. PCE concentrations detected in samples 62 and 63, collected south and north of well #7, were 2.70 and 3.80 ug/l, respectively.

Soil-gas samples collected in the other potential source areas were found to have negative potential as a source of the PCE contamination. Samples 36 and 37, collected at the location of the former bowling pin factory, had measured levels of 0 ug/l. Samples 59, 60, 62, 64, and 65, collected in the vicinity of the Third Street sewer line, had detected levels of 1.20, 0, 2.70, 1.30, and 2.90 ug/l, respectively. These detected PCE levels are not oriented along the east-west axis of the sewer line. The detected levels of PCE decreased westward along the sewer line indicating that a PCE source is not located to the west (Figure 9, Table 5).

Samples 72, 73, and 74, collected at the former AMU cooling ponds location, had measured PCE levels of 0, 0.20, and 0 ug/l, respectively (Figure 9, Table 5).

The configuration of the PCE plume contaminating the ground water of Atlantic, Iowa, is illustrated in Figures 9, 10, and 11. Figure 9 is a hand-contoured, two-dimensional representation that depicts the areal extent of the plume. Figure 10 is a computer-generated map of



EXPLANATION

△ GRIDDED SAMPLE LOCATION
SAMPLE NOT TAKEN

▲ SAMPLE LOCATION

C.I.=10^X CONCENTRATIONS IN ug/l

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0' 250' 500' 1000' 1500'

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FIGURE 9: AREAL EXTENT OF PCE PLUME
(HAND CONTOURED)

TABLE 5
Soil-Gas Data
Atlantic PWS, Atlantic, Iowa
E & E/FIT, August 1987

Sample #	Results in ug/l	Sample #	Results in ug/l
1	11.21	41	2.80
2	35.60	42	NST
3	0.03	43	0
4	0.39*	44	2.20
4A	0.70*	45	NST
5	119.0	46	1.20
6	NST	47	NST
7	0.30	48	NST
8	NST	49	0
9	NST	50	NST
10	NST	51	0
11	0	52	NST
12	0	53	0.50*
13	0	54	0
14	0	55	NST
15	0	56	0
16	0	57	NST
17	1.20	58	2.70
18	NST	59	1.20
19	0	60	0
20	6.20	61	0.80
21	5.30	62	2.70
22	NST	63	3.80
23	0.20	64	1.30
24	NST	65	2.90
25	0.10*	66	NST
26	0.10	67	0
27	NST	68	0.40
28	1.30	69	0.50
29	NST	70	4.30
30	0.50	71	NST
31	NST	72	0
32	2.10	73	0.20
33	NST	74	0
34	NST	75	NST
35	0	76	NST
36	0	77	76.9
37	0	78	3.60
38	0	79	0
39	NST	80	0.46
40	NST		

NST = No sample taken
* = Full vacuum release was not established in taking sample. This was due to high clay content in soil. Concentrations expected to be higher than field measurements indicate.

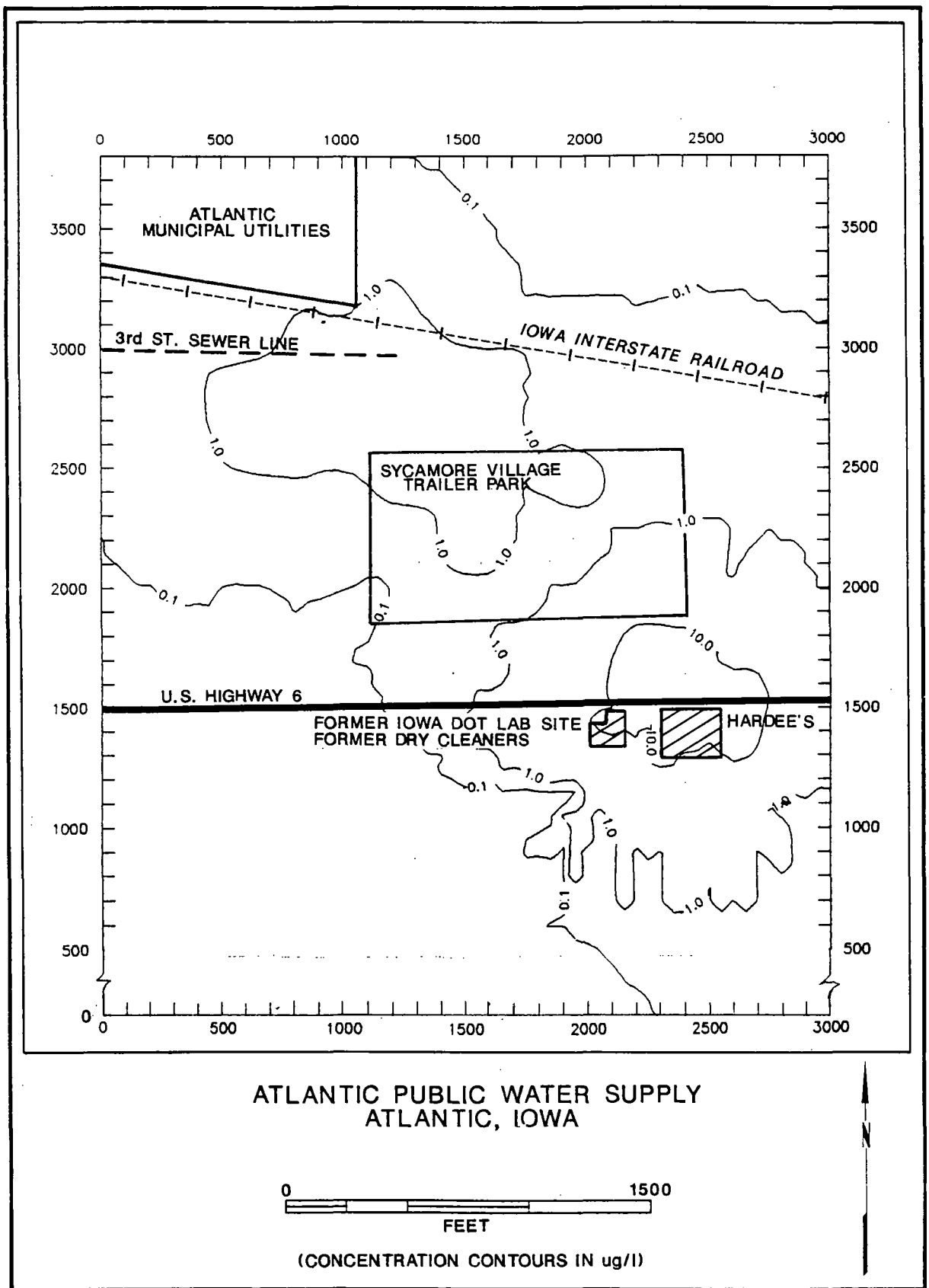

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FIGURE 10: AREAL EXTENT OF PCE PLUME
(COMPUTER CONTOURED)

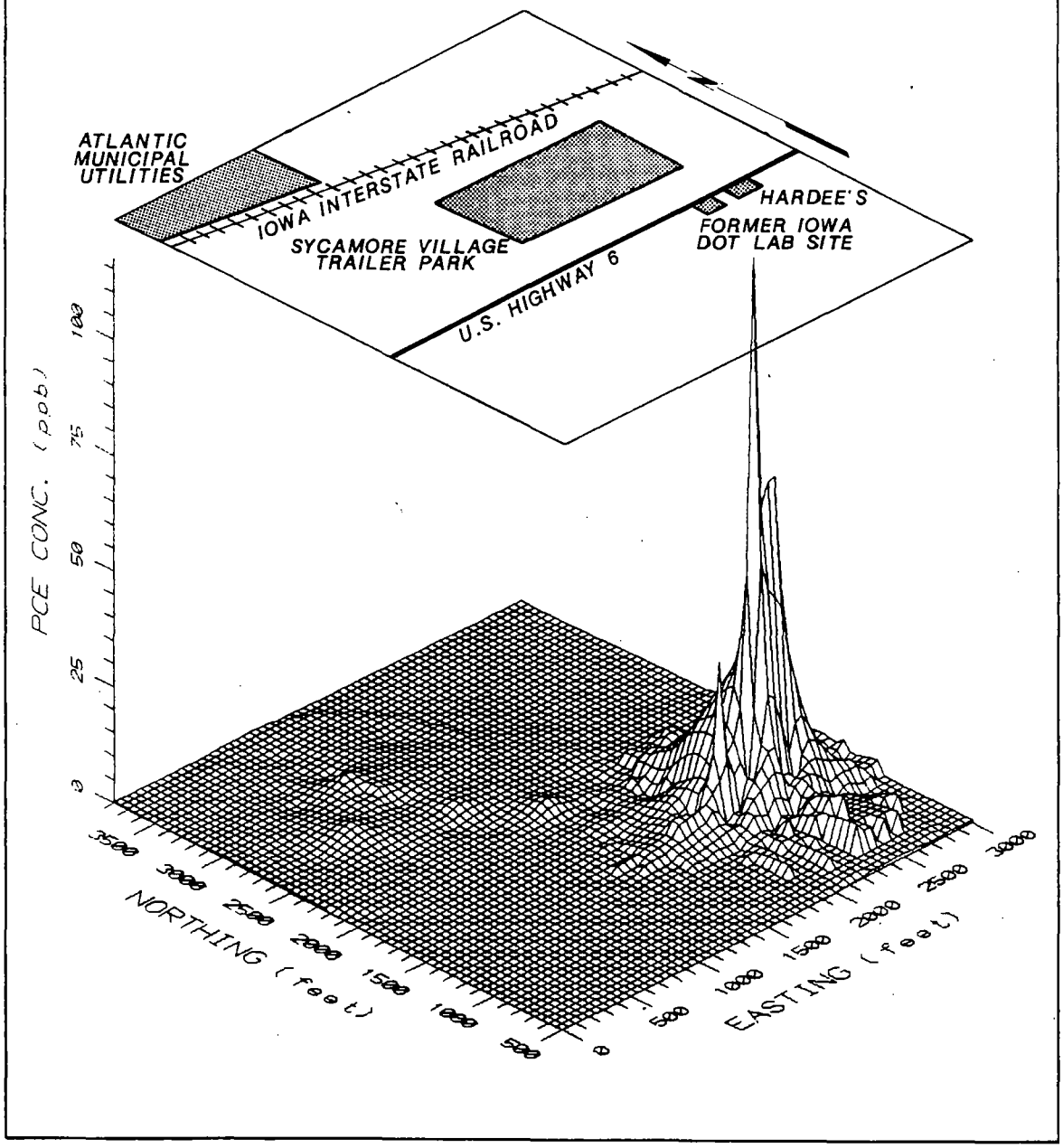

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FIGURE 11: 3-DIMENSIONAL REPRESENTATION OF PCE PLUME

the PCE plume in a two-dimensional form, similar to Figure 9. Figure 11 is a computer-generated, three-dimensional format, created with X, Y, and Z coordinates, with Z representing the detected PCE concentration at each sample point. Computer graphics were generated by the Compaq personal computer (PC) using the Golden Software, Inc. SURFER program. Figure 11 clearly illustrates the point source of the PCE located between the former IDOT lab/dry cleaning facility site and the Hardee's restaurant. From the point source, the plume migrates north-northwest to AMU well #7. The approximate dimensions of the PCE plume are 3,000 by 1,000 feet. The leading edge of the detected PCE plume, as mapped, terminates at the southern boundary of the AMU property approximately 400 feet northwest of well #7.

6.2 SOIL SAMPLES

Soil samples IK994001, 002, and 003, collected from within the point source area, confirmed the existence of PCE contamination in the subsurface (Table 6). The volatile organic compounds identified in soil sample 001 were 1,1,1 trichloroethene (methyl chloroform), qualitatively identified (CLP M Code) at 4.0 ug/kg, and tetrachloroethene (PCE) which was qualitatively identified at 2.0 M ug/kg. Di-n-butylphthalate, a semi-volatile (PAH) organic compound, was qualitatively identified at 110 M ug/kg. No pesticides were detected in soil sample 001. The volatile organic compound 1,1,1 trichloroethane was qualitatively identified at 6.0 M ug/kg, and PCE was identified at 20 ug/kg. The PAHs detected in sample 002 were phenathrene, identified at 420 ug/kg, and anthracene, which was qualitatively identified at 99 M ug/kg. The pesticides dieldrin and endosulfan sulfate were detected at concentrations of 9 and 41 ug/kg, respectively.

PCE was detected in soil sample 003 at 29 ug/l. Soil sample 003 also exhibited the highest number of detected PAHs. Benzo (B) fluoranthene was detected at 500 ug/kg, and the following compounds were qualitatively identified: diethylphthalate at 88 M ug/kg; phenanthrene at 160 M ug/kg; fluoranthene at 380 M ug/kg; pyrene at 340 M ug/kg; benzo (A) anthracene at 220 M ug/kg; chrysene at 220 M ug/kg;

TABLE 6
Soil Sample Results
Atlantic PWS, Atlantic Iowa
E & E/FIT, August 1987
Sample Series IK994

Compound (ug/kg)	001	002	003
Volatiles			
1,1,1 Trichloroethane	4.0M	6.0M	ND
Tetrachloroethene (PCE)	2.0M	20.0	29.0
Semi-Volatiles			
Diethylphthalate	ND	ND	88.0M
Phenanthrene	ND	420.0	160.M
Anthracene	ND	99.0	ND
Di-n-Butylphthalate	110.0M	ND	ND
Fluoranthene	ND	ND	380.0M
Pyrene	ND	ND	340.0M
Benzo(A)Anthracene	ND	ND	220.0M
Chrysene	ND	ND	220.0M
Benzo(A)Fluoranthene	ND	ND	500.0
Benzo(A)Pyrene	ND	ND	240.0M
Indeno(1,2,3-CD) Pyrene	ND	ND	180.0M
Pesticides			
Dieldrin	ND	9.0	ND
4,4'-DDE	ND	ND	8.4M
Endosulfan Sulfate	ND	41.0	27.0M

ND = not detected

J = Compound was qualitatively identified; however, compound failed to meet all QA criteria and therefore is only an estimated value.

M = Compound was qualitatively identified; however, quantitative value is less than contract required detection limits (CLP data); or value is less than limit of quantification (EPA data).

Note: Only detected levels are reported. See Figure 7 for sample locations and Appendix F for complete analytical results.

benzo (A) pyrene at 240 M ug/kg; and indeno (1,2,3-CD) pyrene at 180 M ug/kg. The pesticides 4,4'-DDE and endosulfan sulfate were qualitatively identified at 8.4 M and 27. M ug/kg, respectively.

Hydrocarbons, molecular sulfur, unsaturated hydrocarbons, and benzo (J) fluoranthene were tentatively identified in the soil samples. These compounds and their estimated concentrations are listed in the data transmittal of soil sample analytical results, which is attached as Appendix F.

6.3 MONTHLY PRECIPITATION (1980-1987) VS. DETECTED PCE CONCENTRATION IN WELL #7

As part of the study, the concentrations of PCE detected in well #7 were compared to the monthly rainfall totals recorded in Atlantic, Iowa, since January 1980. Precipitation statistics were gathered from the National Climatic Data Center located in Ashville, North Carolina. Recorded snowfall totals were converted to rainfall using the ratio of 10 inches of snowfall equal to one inch of rainfall (Ref. 13).

The precipitation data and PCE concentration data for well #7 plotted chronologically suggests that a direct relationship exists between the periods of peak rainfall and elevated concentrations of PCE detected in well #7 (Figure 12). Though well sampling data is sporadic, a lag period is observed between the periods of peak rainfall and elevated PCE levels. This is best illustrated by comparing the graphic data for the time intervals from June 1983 to December 1985, and January 1986 to June 1987. From the emerging pattern, it is hypothesized that if well #7 had been sampled after the record rainfall of 10.57 inches observed in the month of August 1987, an elevated level of PCE would have been recorded in well #7. This is dependent however, on the original volume of PCE spilled at the point source, the time that has passed since the occurrence of the spill, and the depletion and degradation rates of the PCE source. These facts are unknown. Because the PCE source is not continuous; but rather a one-time occurrence, the overall trend of PCE levels in well #7 should be decreasing over time.

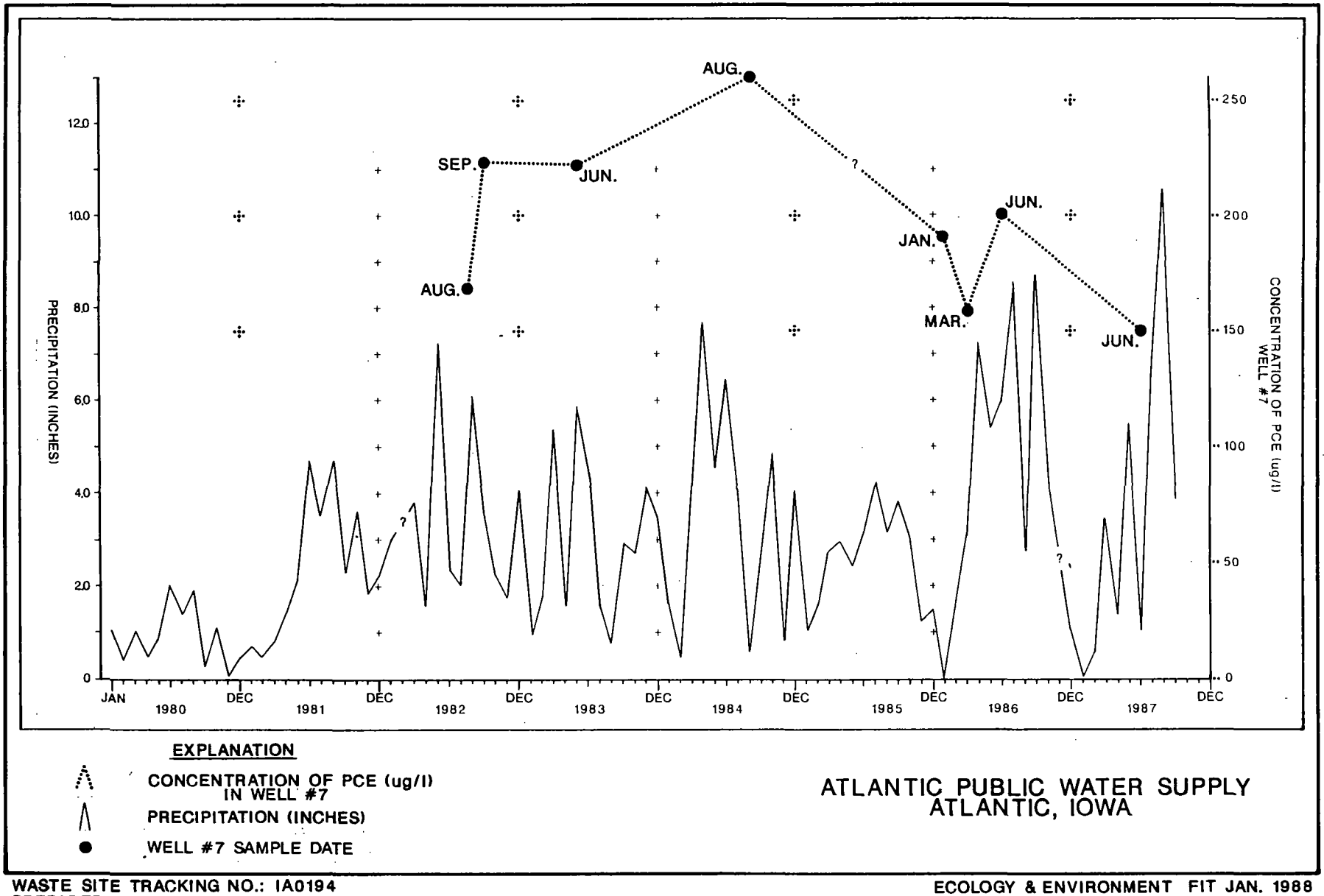

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FIGURE: 12: MONTHLY PRECIPITATION vs. PCE CONCENTRATIONS DETECTED IN WELL #7

SECTION 7: DISCUSSION OF RESULTS

The PCE contamination affecting the Atlantic PWS has been shown by the soil-gas investigation to be originating from a point source located 200 to 250 feet east of the former IDOT lab facility/former dry cleaning facility and 30 feet north of the Hardee's restaurant. The PCE plume originating from this point source is migrating through the sands and silts of the shallow drift aquifer and Dakota Sandstone by the process of advection. Advection is the dominant factor by which a dissolved solute is transported by the bulk motion of flowing ground water. The ground water flow direction in the study area is north-northwest following the local topography. The observed ground water velocities for a uniform sandy shallow aquifer can range from one meter/year (m/y) to 100 m/y. In most cases, however, the flow velocities under natural gradient conditions are between 10 and 100 m/y (Ref. 14). In the zone of influence of a high capacity well or well field, the artificially increased gradient substantially increases the local ground water velocities and the average travel times for ground water flow are reduced. This is the case in the Atlantic PWS, where the AMU well field is approximately 3,000 feet north-northwest of the point source. Because of the well field's influence, the PCE travels through the subsurface at a faster rate than normally expected in the shallow aquifer system.

The dissolved contaminant PCE also spreads as it moves with the ground water. This process, called dispersion, results from two basic processes: molecular diffusion and mechanical mixing. Dispersion and mechanical mixing during transport results in the dilution of the PCE with maximum concentrations diminishing with increasing distances from the source. The PCE plume delineated in Atlantic, Iowa, is consistent with these principles (Figure 9, 10, and Plat 1). Maximum concentrations are observed within a 100-foot radius of the point source with PCE concentrations ranging from 11.21 to 119 ug/l. PCE concentrations rapidly decrease as the geographic limits of the plume are approached.

7.1 ATTRIBUTION

7.1.1 Volatiles (PCE)

The soil-gas study and soil sample results indicate that the PCE is originating from an area located 200 to 250 feet east of the former IDOT lab facility/former dry cleaning facility. The IDOT was the most recent occupant of the building located at 1205 East Seventh Street, utilizing the structure as a material testing laboratory from 1974 to 1986. Solvents were routinely used by the IDOT at this facility. The IDOT relocated its operation in March 1986 to a site east of the city.

A dry cleaning facility is believed to have operated at this structure in the years preceding 1960. PCE is a common dry cleaning solvent and is highly suspected to have been used during the dry cleaner's operational years.

Relatively small amounts of PCE (tens of gallons of pure solvent) can significantly contaminate ground water. A spill of this size could for several years exceed the proposed maximum acceptable limits of PCE of 10 to 50 ug/l in well #7, located 3,000 feet northwest of the contaminant source. The IDOT lab operations and/or the dry cleaning operation are highly suspected sources of the PCE contamination. Because the appearance of PCE in the Atlantic PWS wells may post-date the actual occurrence of the PCE spill by as much as twenty years, it is difficult to exclude either the former operations of the dry cleaning business or the former operations of the IDOT lab as the contaminant source. If ground water velocities could be measured, utilizing a dye-trace method, the travel time for PCE from the point source to well #7 could be measured. This information would be important in determining an approximate time of the PCE spill.

From the available data and information, it is hypothesized that a PCE spill occurred at or near the former site of the IDOT lab/dry cleaning facility in the past 10 to 20 years. A portion of the liquid PCE would have volatilized to the atmosphere, and the remaining PCE would have migrated by surface runoff and ground water flow to the topographic low where the Hardee's Restaurant is now located (1309 E. Seventh Street).

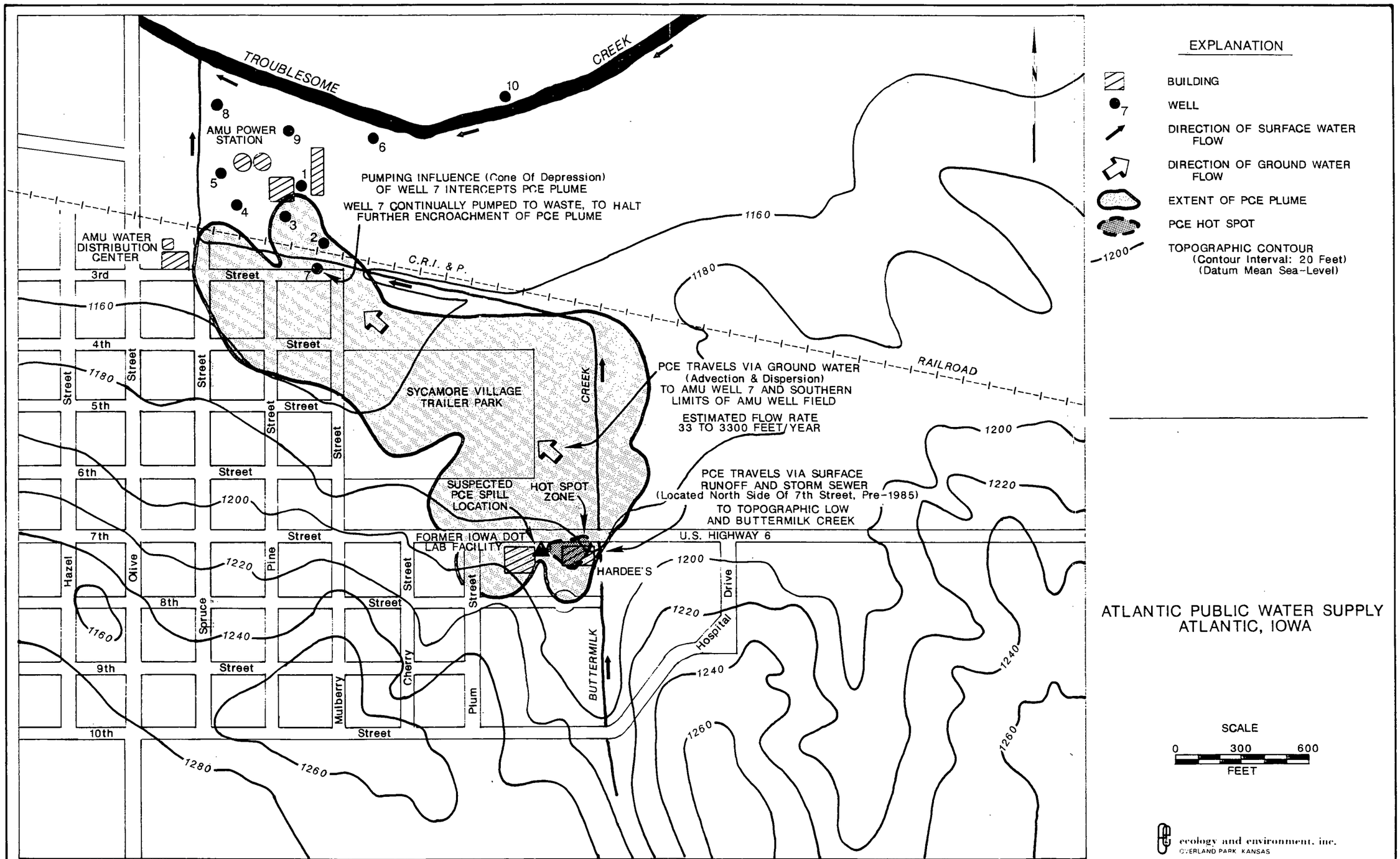
The migration of PCE to the present source area may have been expediated if the PCE had been introduced to the Seventh Street storm sewer system. This storm sewer system was constructed on the north side of Seventh Street in 1952. It was designed to flow east to the existing drainage ditch, Buttermilk Creek, which is the natural drainage feature receiving surface runoff from the area. In 1985, Seventh Street was reconstructed and the storm sewer system was relocated to the south side of Seventh Street. The flowline was designed to flow east to the existing drainage feature as well. Storm water intake exists adjacent to the former IDOT lab/dry cleaning facility and the Hardee's Restaurant (Ref. 15). The storm sewer system may have served as a conduit for PCE migration eastward following the topographic gradient. Soil samples collected from a depth of 3 to 6 feet along the south side of Seventh Street indicate that coarser material was added as fill material during relocation of the storm sewer system. Similiar conditions are believed to exist along the former storm sewer system pathway. The coarser fill material would have greater porosity and transmissivity properties for surface water and contaminant infiltration to the ground water below.

From the topographic low, which served as a collection point for the PCE contaminated surface water and ground water, the PCE then migrated with ground water flow to the north-northwest. The PCE plume originating from the point source travelled beneath the Sycamore Village Trailer Park following the hydraulic gradient to well #7. The cone of depression formed from pumping well #7 increased the hydraulic gradient surrounding the well and thus increased the travel rate of the PCE plume to well #7.

Figure 13 depicts the hypothesized sequence of events leading to the PCE contamination of the AMU well field.

7.1.2 Semi Volatiles

Eleven semi-volatile compounds were positively identified or qualitatively identified in the soil samples collected. These samples were collected within 5 to 10 feet of Seventh Street (US Highway #6), a major automobile and truck transportation route.



WASTE SITE TRACKING NO.: IA0194
PREPARED BY: C. WILLIAMS

FIT APRIL 1988

FIGURE 13: HYPOTHESIZED MIGRATION ROUTE OF PCE

The semi-volatile compounds belonging to the polynuclear aromatic hydrocarbon (PAH) group identified were anthracene, fluoranthene, pyrene, chrysene, phenanthrene, benzo (B) fluoranthene, indeno (1,2,3-CD) pyrene, and benzo (A) pyrene. These PAHs, widespread in the environment, result from the incomplete combustion of carbon and hydrogen-containing fuels in combustion engines that power motor vehicles, as a by-product of refuse burning, or as a component of petroleum asphalt (Ref. 16 and 17).

Anthracene and dibutyl phthalate are raw materials used in the formulation of insecticides and are now common environmental contaminants (Ref. 16 and 17). Dibutyl phthalate and diethyl phthalate are plasticizers that are used in many types of products including adhesives, resins, surface lubricants, and plastic products. Dibutyl phthalate and diethyl phthalate are known to be widely distributed in the environment and have been detected in various forms of marine life, in soil samples, and in both animal and human tissue (Ref. 16, 17, and 18).

7.1.3 Pesticides

The pesticides dieldrin, 4,4'DDE, and endosulfan sulfate were detected in the soil samples collected. These pesticides are commonly used agricultural chemicals and are typically found in the soils of agricultural communities or in areas where pesticides have been introduced to control insect populations (mosquito, gypsy moth, etc.) (Ref. 19).

7.2 ENVIRONMENTAL CONSIDERATIONS

The Maximum Contaminant Level (MCL) for PCE has not been established by the EPA, although 10 to 50 ug/l is the range currently under discussion. The highest PCE concentration detected in the Atlantic PWS was found in the sample of unfinished water in well #7. Since PCE was first observed in this well in August 1982, the recorded PCE levels have ranged from 150 to 260 ug/l. The remaining 10 functional wells of the Atlantic PWS have not exceeded a level of 4 ug/l PCE (Table 1).

PCE metabolites bioaccumulate to some degree during continued exposure. High acute exposure results in depression of the central nervous system and transient dysfunction of the liver and kindey. The National Cancer Institute (NCI) has concluded that PCE is a liver carcinogen in mice but not in rats (Ref. 4). See Table 3 for the projected upper lifetime cancer risks for PCE. PCE has not been detected in excess of <0.2 ug/l in the finished drinking water of the Atlantic PWS.

The concentrations of semi-volatiles and pesticides detected in soil samples collected are typical of those found in industrial and agricultural areas. These compounds are known to be widely distributed in the environment. The phthalates detected in soil samples 001 and 003 are below the Occupational Safety and Health Administration (OSHA) exposure level of 2 mg/l for these compounds (Ref. 16). The remaining PAHs detected in soil samples 001, 002, and 003 are likely the result of pyrolysis or incomplete combustion. These PAHs have been detected in automobile emissions, coal tar, petroleum asphalt, road dust, and sewage water. Human exposure to these compounds is primarily through inhalation of smoke from the incomplete combustion of organic compounds. Benzo (B) fluoranthene, benzo (A) anthracene, and chrysene are slightly carcinogenic. Benzo (A) pyrene, which was qualitatively detected in soil sample 003 at 240 M ug/l, is a potent carcinogen. Benzo (A) pyrene has been detected in cigarette smoke at levels ranging from 0.2 to 12.2 ug/100 cigarettes, and in foods at low levels ranging from 0.1 to 5 ug/l (Ref. 16). The detected PAHs in soil samples 001, 002, and 003 were found at levels expected in an industrial/agricultural area such as Atlantic, Iowa.

The pesticides 4,4'-DDE, endosulfan sulfate, and dieldrin were detected at low concentrations in the soil samples collected. Dieldrin, a cyclodiene, is ubiquitous in the environment and heavily bioconcentrated in the lipids of terrestrial and aquatic wildlife, humans, and foods. Little is certain about the degradation and fate of this compound. The cyclodiene insecticides present the greatest hazard of residual pesticides, particularly in water (Ref. 20). The acute oral LD50 in rats for dieldrin is 37 to 87 mg/kg (Ref. 21).

The pesticide 4,4'-DDE is of moderate toxicity to humans and other organisms and is persistent in the environment. Little is certain about the degradation pathway of 4,4-DDE (Ref. 21). The acute oral toxicity of 4,4-DDE for humans is 250 mg/kg (Ref. 21).

The pesticide endosulfan sulfate, a hexachloro compound qualitatively detected in soil samples 002 and 003 at low concentrations, is a central nervous system stimulant for which no specific antidote is available. The acute oral LD50 for rats is 70 mg/kg in aqueous suspension (Ref. 21).

It has been shown that soil pesticide levels of Manhattan, Kansas, a representative urban-agricultural area, averages 0.15 mg/kg for 4,4'-DDE and 0.04 mg/kg for dieldrin. Endosulfan sulfate was not detected in the Manhattan, Kansas, soil study (Ref. 19).

SECTION 8: SUMMARY AND CONCLUSIONS

The E & E/FIT conducted a soil-gas survey for the city of Atlantic, Iowa, and the IDNR the week of August 24, 1987. This investigation was authorized by the Region VII EPA under TDD # F-07-8708-015. The soil-gas investigation successfully delineated the areal extent of a PCE plume and identified the geographic location of the PCE point source. The source of PCE has been placed 200 to 250 feet east of the former Iowa Department of Transporation Laboratory facility/former dry cleaning facility and 30 feet north of the northwest corner of the Hardee's restaurant facility. The dimensions of the PCE plume are approximately 3,000 by 1,000 feet with an orientation along a northwest-southeast axis. The plume extends north-northwest from the point source to its northern limit beneath the southern boundary of the AMU property, approximately 400 feet northwest of the contaminated AMU well #7.

Three soil samples collected in the point source "hot spot" area confirmed the existence of PCE in the shallow subsurface. Several pesticides and 11 PAHs were identified in the soil samples as well. These pesticides and PAH compounds were detected at low concentrations and are ubiquitous to the environment.

SECTION 9: REFERENCES

1. U.S. Geological Survey, 1966, Topographic Map, 7 1/2 minute series, Atlantic Quadrangle, Cass County, Iowa. Scale 1:24,000.

2. U.S. Geological Survey, 1966, Topographic Map, 7 1/2 minute series, Wiota Quadrangle, Cass County, Iowa. Scale 1:24,000.

3. Personal Conversation: 10 June, 1987, Philip C. Dula, E & E/FIT, with Richard Stevens, Superintendent Atlantic Municipal Utilities, 15 West Third St., Atlantic, Iowa 50022. (713) 243-1395.

4. AWNA Research Foundation, 1983, Occurrence and Removal of Volatile Organic Compounds from Drinking Water. Denver, Colorado.

5. Sitting, Mashall, Handbook of Toxic and Hazardous Chemical and Carcinogens, Park Ridge: Nores Publishing, 1985, 2nd Edition.

6. United Stated Environmental Protection Agency, 1976, Organic Compounds Identified in Drinking Water. U.S. Health Effects Research Laboratory, Cincinnati, Ohio.

7. Wood, P.R. Introductory Study of the Biodegradation of the Chlorinated Methane, Ethane, and Ethene Compounds. Progress Report Experimental Design No. 12. U.S. EPA Cooperative Agreement #CR 806890, June, 1980.

8. Soil Conservation Service, 1969. Soil Survey of Cass County, Iowa. U.S. Department of Agriculture in cooperation with the Iowa Agricultural Experiment Station.

9. National Climatic Data Center - Precipitation Data from January, 1980 to August, 1987.

10. Simpson, Howard E., and W.H. Norton, Underground Waters of the Southwest District, Cass County. Iowa Geological Survey, Volume XX1, Annual Reports 1910 and 1911, pp. 1117-1124.

11. Personal Conversation: 10 June, 1987, Philip C. Dula, E & E/FIT, with William Hoeck, Water Works Manager, Atlantic Municipal Utilities, 15 West Third Street, Atlantic, Iowa 50022. (713) 243-1395.

12. Thompson, G.M., and G.L. Morris, Soil Gas Contaminant Investigation: A Dynamic Approach 1987. Ground Water Monitoring Review.

13. Albright J.G., Physical Meterology. New York Prentice Hall Inc., 1939.

14. Mackay, D.M., P.V. Roberts, and J.A. Cherry, Transport of Organic Contaminants in Ground Water. Environmental Science and Technology Vol. 19, No. 5, 1985 pp. 384-392.

15. Personal Communication: September 25, 1987. Philip C. Dula, E & E/FIT, with Kern Miller, Engineer, Atlantic Municipal Utilities.

16. U.S. Department of Health and Human Services. Third Annual Report on Carcinogens. September 1983. Research Triangle Park, North Carolina.

17. Choudhary, G., Chemical Hazards in the Work Place, American Chemical Society Symposium Series 149, 1980.

18. Parmeggiani, L., Encyclopedia of Occupational Health and Safety Volume 2, 1983, International Labor Office Publication.

19. Wiersma, G.B., H. Tai, and P.E. Sand, Pesticides in Soil, Pesticides Monitoring Journal, Vol. 6, No. 2, September 1972.

20. National Academy of Sciences, Drinking Water and Health, Volume 1, 1977, Washington, D.C.

21. Farm Chemicals Handbook, Meister Publishing Co., 1988.

22. Personal Communication: April 19, 1988. Kern Miller, Engineer, Atlantic Municipal Utilities. Philip C. Dula, E & E/FIT.

APPENDIX A

TECHNICAL DIRECTIVE DOCUMENT

SDM

PD

1A. Cost Center: FT 1307	FIT ZONE II CONTRACT Contract Number 68-01-7347 TECHNICAL DIRECTIVE DOCUMENT (TDD)	2. TDD Number: F-07-8701-1.5
1B. Account Number: FIA0194SA		2A. Amendment: ☒ Administrative ☐ Technical

3A. Priority: ☐ High ☒ Medium ☐ Low	3B. Key EPA Contact: Name: PETE CULVER Phone: 913-236-2856

4A. Estimate of Technical Hours:	4B. Subcontract:	4C. Estimate of Subcontract Cost:	5A. SSID Number:	5B. CERID Number:
900	NA	NA	(IAD039954300)	

5C. EPA Site Name:	5D. City/County/State:
ATLANTIC PUBLIC WATER SUPPLY	ATLANTIC / CASS / IOWA

6. Desired Report Format:	7A. Activity Start Date:	7B. Estimated Completion Date:
☒ Formal Report ☐ Standard Report ☐ Other (Specify): ☐ Letter Report ☐ Formal Briefing	1-8-87	* 2-25-88

8A. Type of Activity:
☐ PA ☐ HRS Support ☐ Enforcement Support ☐ Training
☒ SI ☐ QA Support ☐ Program Management ☐ General Technical Assistance
☐ ESI ☐ Special Studies ☐ Equipment Maintenance

8B. FIT/SCAP Goal: Will Deliverable Meet a Unit of the Goal? ☒ Yes ☐ No

9. General Task Description: PREPARE A WORK PLAN AND CONDUCT A SOIL-GAS SURVEY OF THE ATLANTIC PUBLIC WATER SUPPLY SITE IN ORDER TO DETERMINE THE SOURCE(S) OF PCE CONTAMINATION

10. Specific Elements:	11. Interim Deadlines:
1) BACKGROUND REVIEW	
2) SITE RECONNAISSANCE	
3) ATTEND TECHNICAL MEETINGS AS NECESSARY	
4) PREPARE WORK PLAN FOR SOIL GAS SURVEY	6-30-87
5) PREPARE DRAFT HRS	6-30-87
6) CONDUCT SITE INVESTIGATION - UNITED SOIL SAMPLING - SOIL-GAS SURVEY	11-15-87
7) PLOT AND INTERPRET DATA	
8) SUBMIT TRIP REPORT ☐ Additional Scope Attached	12-7-87

12. Comments: 9) SUBMIT FINAL REPORT * 2-25-88

*AMEND COMPLETION DATE FOR SUBMITTAL OF FINAL REPORT TO 2-15-88. DATA RECEIVED LATE FROM CLP 12-21-87.

13. Authorizing: (Signature)	☐ RPO ☐ DPO ☐ PO	14. Date: 1/14/88
15. Received by: (Contractor FITOM Signature) JAN 14 1988	☒ Accepted ☐ Accepted with Exceptions (Attached) ☐ Rejected	16. Date: 1/15/88

RECEIVED

Distribution: Sheet 1 (White)—FITOM Copy; Sheet 2 (Green)—RPO Copy; Sheet 3 (Canary)—ZPM, WDC Copy; Sheet 4 (Pink)—PO, WDC Copy; Sheet 5 (Goldenrod)—CO, WDC Copy

F001R077

E&F K C

APPENDIX B

EPA SITE INSPECTION FORM 2070-13

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
Atlantic Public Water Supply	15 West Third Street				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG DIST**
Atlantic	IA	50022	Cass		

09 COORDINATES		10 TYPE OF OWNERSHIP (Check one)
LATITUDE	LONGITUDE	___A. PRIVATE ___B. FEDERAL ___C. STATE ___D.COUNTY ___E. MUNICIPAL
41°25'00".N	95°00'00".W	___F. OTHER ___G.UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION		
8/24-28/88	X ACTIVE	1880's	present	___UNKNOWN
MO/DAY/YR	___INACTIVE	BEGINNING YEAR	ENDING YEAR	

04 AGENCY PERFORMING INSPECTION (Check all that apply)

___A. EPA X B. EPA CONTRACTOR E & E, Inc. (Name of firm) ___C. MUNICIPAL ___D. MUNICIPAL CONTRACTOR ___ (Name of firm)

___E. STATE ___F. STATE CONTRACTOR ___ (Name of firm) ___G. OTHER ___ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Philip C. Dula	Geologist/ Hydrogeologist	E & E/FIT	(913) 432-9961
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO.**
William Kwoka	Chemist	E & E/FIT	(913) 432-9961
Anne Melia	Chemist	E & E/FIT	(913) 432-9961
Robert Wiggans	Driller/Biologist	E & E/FIT	(913) 432-9961
Kevin Hugill	Driller/Environmental Technician	E & E/FIT	(913) 432-9961
Jean Carleton	Environmental Engineer	IDNR	(515) 251-7040
13 SITE REPRESENTATIVES INTERVIEWED	**14 TITLE**	**15 ADDRESS**	**16 TELEPHONE NO.**
Richard Stevens	A.M.U. Superintendent	15 West Third Street Atlantic, Iowa 50022	(712) 243-1395
Kern Miller	A.M.U. Engineer	15 West Third Street Atlantic, Iowa 50022	(712) 243-1395
William Hoeck	A.M.U. Water Mgr.	15 West Third Street Atlantic, Iowa 50022	(712) 243-1395

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
X PERMISSION ___ WARRANT	8-24-88 to 8-28-88	Cloudy, Heavy Rainfall (4" 8/24-8/25) 11" month of August, 1987. Temp 55-70°F.

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Pete Culver	EPA - Region VII	(913) 236-2856

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Philip C. Dula	E & E, Inc.	FIT	(913) 432-9961	3/2/88

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE IA	02 SITE NUMBER IAD039954300

I. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)	02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)	03 WASTE CHARACTERISTICS (Check all that apply)
__A. SOLID	TONS _____	X A. TOXIC
__B. POWDER, FINES	CUBIC YARDS Unknown	___B. CORROSIVE
___C. SLUDGE	NO. OF DRUMS _____	___C. RADIOACTIVE
__D. OTHER _____ (Specify)		X D. PERSISTENT
___E. SLURRY		X E. SOLUBLE
X F. LIQUID		___F. INFECTIOUS
X G. GAS		___G. FLAMMABLE
		___H. IGNITABLE
		X I. HIGHLY VOLATILE
		___J. EXPLOSIVE
		___K. REACTIVE
		___L. INCOMPATIBLE
		___M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS		ug/l	Tetrachloroethene contamination of PWS
PSD	PESTICIDES		ug/kg	Chlorinated Hydrocarbons
OCC	OTHER ORGANIC CHEMICALS		ug/kg	PAHs & Phthalates
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

V. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SOL	Tetrachloroethene	127-18-4	Unknown	150-260	ug/l
SOL	1,1,1 Trichloroethane	79-00-5	Unknown	6.0	ug/l
PSD	Dieldrin	60-57-1		9.0	ug/kg
PSD	4,4'-DDE	72-55-9		8.4M	ug/kg
PSD	Endosulfan Sulfate	115-29-7		41	ug/kg
OCC	Diethylphthalate	84-66-2		88.M	ug/kg
OCC	Phenanthrene	85-01-8	Ubiquitous to Environment.	420	ug/kg
OCC	Anthracene	120-12-7	Concentrations within	99M	ug/kg
OCC	Di-N-Butylphthalate	84-74-2	normally observed levels	110M	ug/kg
OCC	Fluoranthene	206-44-0	of urban and agricultural	380M	ug/kg
OCC	Pyrene	129-00-0	areas.	340M	ug/kg
OCC	Benzo(A)Anthracene	56-55-3		220M	ug/kg
OCC	Chrysene	218-01-9		220M	ug/kg
OCC	Benzo(B)Fluoranthene	205-99-2		500	ug/kg
OCC	Benzo(A)Pyrene	50-32-8		240M	ug/kg
OCC	Indeno(1,2,3-CD)Pyrene	193-39-5		180M	ug/kg

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	NA		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

° AWWA Research Council - Occurence and Removal of Volatile Organic Chemicals from Drinking Water, 1983.
° The Merck Index - 9th Edition, 1976.
° Farmers Handbook 1988
° Registry of Toxic Effects of Chemical Substances, 1978.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 _X_ A. GROUNDWATER CONTAMINATION 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 7787 04 NARRATIVE DESCRIPTION

PCE Contamination has been detected in wells # 2,3,4, and 7 of the AMU water well field since 8/82. Concentrations in well #7, the well of highest detected levels of PCE have ranged from 150 ug/l - 260 ug/l.

01 ___ B. SURFACE WATER CONTAMINATION 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None Reported - Due to the highly volatile physical property of PCE. It is not likely that it will persist in surface water.

01 ___ C. CONTAMINATION OF AIR 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None Reported or observed.

01 ___ D. FIRE/EXPLOSIVE CONDITIONS 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

Not Applicable. PCE has no flash point. Vapor Density 5.72 vapor may decompose at high temperature with evolution of poisonous gases such as chlorine and phosgene.

01 ___ E. DIRECT CONTACT 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None Reported - PCE confined to shallow unconfined aquifer.

01 ___ F. CONTAMINATION OF SOIL 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) 04 NARRATIVE DESCRIPTION

Not Applicable

01 ___ G. DRINKING WATER CONTAMINATION 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+ 04 NARRATIVE DESCRIPTION

PCE contamination of the Atlantic PWS existing water well field. PCE plume extends to southern limit of field, wells # 4 and 7. Further encroachment of the plume has been stopped by continually pumping well #7 to waste.

01 ___ H. WORKER EXPOSURE/INJURY 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None reported

01 ___ I. POPULATION EXPOSURE/INJURY 02 ___ OBSERVED (DATE: _____) ___ POTENTIAL ___ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 7769 04 NARRATIVE DESCRIPTION

PCE has not been detected in excess of <0.2 ug/l in the finished water samples of the Atlantic PWS. EPA has not set an MCL for PCE. A MCL of 10 to 50 ug/l is under consideration.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

II. HAZARDOUS CONDITIONS AND INCIDENTS (CONTINUED)

___J. DAMAGE TO FLORA — 02 ___ OBSERVED (DATE: 8/24-28/88) X POTENTIAL ___ ALLEGED

04 NARRATIVE DESCRIPTION

None Observed - PCE contamination of shallow unconfined aquifer. PCE does not affect aquatic plants and is rapidly eliminated.

___K. DAMAGE TO FAUNA — 02 ___ OBSERVED (DATE: 8/24-28/88) X POTENTIAL ___ ALLEGED

4 NARRATIVE DESCRIPTION (Include name(s) of species)

None observed.

___L. CONTAMINATION OF FOOD CHAIN — 02 ___ OBSERVED (DATE: 8/24-28/88) X POTENTIAL ___ ALLEGED

04 NARRATIVE DESCRIPTION

None Observed. PCE can be carried up the food chain.

___M. UNSTABLE CONTAINMENT OF WASTES — 02 ___ OBSERVED (DATE: 8/24-28/88) ___ POTENTIAL ___ ALLEGED

(Spills/runoff/standing liquids/leaking drums)

03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

No stored waste observed during site investigation at former IDOT Lab/Dry Cleaning site. Site vacant since 1986.

1 ___N. DAMAGE TO OFFSITE PROPERTY — 02 ___ OBSERVED (DATE: 8/24-28/88) ___ POTENTIAL ___ ALLEGED

4 NARRATIVE DESCRIPTION

None observed.

01 ___O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ___ OBSERVED (DATE: 8/24-28/88) ___ POTENTIAL ___ ALLEGED

4 NARRATIVE DESCRIPTION

None observed - It is believed that PCE contamination is the result of a one time spill. This spill may have travelled eastward via Seventh Street storm sewer system.

1 ___P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ___ OBSERVED (DATE: 8/24-28/88) ___ POTENTIAL ___ ALLEGED

04 NARRATIVE DESCRIPTION

None observed.

5 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None observed.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 10,000+

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references. e.g., state files, sample analysis, reports)

° The Merck Index - 9th Edition 1976.
° Toxic & Hazardous Industrial Chemicals Safety Manual 1979.
° Encyclopedia of Occupational Health and Safety Vol. 2 Third Edition 1983.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

II. PERMIT INFORMATION

TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
__A. NPDES				
___B. UIC				
__C. AIR				
__D. RCRA				
__E. RCRA INTERIM STATUS				
__F. SPCC PLAN				
_X_G. STATE (Specify)	150907A			Iowa Water Supply Permit
__H. LOCAL				
_X_I. OTHER (Specify)				
__J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
___A. SURFACE IMPOUNDMENT		
___B. PILES		
___C. DRUMS, ABOVE GROUND		
___D. TANK, ABOVE GROUND		
___E. TANK, BELOW GROUND		
___F. LANDFILL		
___G. LANDFARM		
___H. OPEN DUMP		
_X_I. OTHER Municipal (Specify)	Water Supply	

04 TREATMENT (Check all that apply)

___A. INCINERATION
___B. UNDERGROUND INJECTION
___C. CHEMICAL/PHYSICAL
___D. BIOLOGICAL
___E. WASTE OIL PROCESSING
___F. SOLVENT RECOVERY
___G. OTHER RECYCLING/RECOVERY
___H. OTHER _____ (Specify)

05 Other

_X_A. BUILDINGS ON SITE

06 AREA OF SITE

1 (Acres)

COMMENTS

PCE spill is believed to have occurred at the former IDOT Lab/Former Dry Cleaning facility located at 1205 E. Seventh St., Atlantic, Iowa. Date of alledged spill unknown.

IV. CONTAINMENT

CONTAINMENT OF WASTES (Check one)

___A. ADEQUATE, SECURE ___B.MODERATE ___C.INADEQUATE, POOR ___D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Not applicable - No stored waste or solvents on site - site is vacant.

V. ACCESSIBILITY

WASTE EASILY ACCESSIBLE: ___YES ___NO

COMMENTS

Not applicable.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

° Personal communicaton 8-24-88 - Philip Dula, E & E/FIT and Richard Stevens, Superintendent, AMU.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

I. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ___	B. X
NON-COMMUNITY	C. ___	D. ___

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. X	B. X	C. X
D. ___	E. ___	F. ___

03 DISTANCE TO SITE

A. < 1 (mi)
B. _____ (mi)

II. GROUNDWATER

GROUNDWATER USE IN VICINITY (Check one)

___ A. ONLY SOURCE FOR DRINKING
___ B. DRINKING (Other sources available)
COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)
X C. COMMERCIAL, INDUSTRIAL IRRIGATION (Limited other sources available)
___ D. NOT USED, UNUSABLE

02 POPULATION SERVED BY GROUND WATER 10,000+

03 DISTANCE TO NEAREST DRINKING WATER WELL < 1 (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
Avg. 13 (ft)	Northwest	13 (ft)	720,000/well (gpd)	X YES ___ NO

09 DESCRIPTION OF WELLS (Including usage, depth, and location relative to population and buildings)
Atlantic PWS well field consists of 12 wells, 9 of which are presently on line wells are completed at an average depth of 80 feet in the sands and gravels of the Kansan drift or the Cretaceous, Dakota Sandstone. Static levels range from 12 to 15 feet but vary seasonally. Well field is located in the N 1/2, SW 1/4, Section 4 and the SW 1/4, NE 1/4, Section 4, T 76 N. R. 36 W.

10 RECHARGE AREA SW 1/4, NE 1/4, Section 4, T76N, R36W.

___ YES
X NO

COMMENTS

11 DISCHARGE AREA R36W

X YES
___ NO

COMMENTS Aquifer discharges to Troublesome Creek and the East Nishnabotna River.

IV. SURFACE WATER

1 SURFACE WATER USE (Check one)

X A. RESERVOIR, RECREATION DRINKING WATER SOURCE
___ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES
___ C. COMMERCIAL, INDUSTRIAL
___ D. NOT CURRENTLY USED

2 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Troublesome Creek	NO	< 1 (mi)
Buttermilk Creek	NO	< 1 (mi)
East Nishnabotna River	NO	< 1 (mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

1 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 2000	B. 4000	C. 6000
NO. OF PERSONS	NO. OF PERSONS	NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION

< 1 (mi)

3 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE

> 200

04 DISTANCE TO NEAREST OFF-SITE BUILDING

< 1 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The City of Atlantic, population 7700, is located in southwest Iowa in Cass County. The well field and suspected source of contamination are located in the northeastern quarter of the city.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

I. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

___A. 10^{-6} - 10^{-8} cm/sec X B. 10^{-4} - 10^{-6} cm/sec X C. 10^{-4} - 10^{-3} cm/sec ___D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

X A. IMPERMEABLE (Less than 10^{-6} cm/sec) ___B. RELATIVELY IMPERMEABLE (10^{-4} - 10^{-6} cm/sec) ___C. RELATIVELY PERMEABLE (10^{-2} - 10^{-4} cm/sec) ___D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
80 to 100 (ft)	(Estimated) 0-80 (ft)	Slightly to ~~Moderately Acid~~	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
32 (in)	3.58 (in)	0-3 %	Northwest	0-5 %

09 FLOOD POTENTIAL
SITE IS IN 100 YEAR FLOOD PLAN

10 ___ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum) NA
ESTUARINE: A. _____ (mi) OTHER: B. _____ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species) NA
_____ (mi)
ENDANGERED SPECIES: _____

13 LAND USE IN VICINITY
DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS PRIME AG LAND	AG LAND
A. < 1 (mi)	B. < 1 (mi)	C. < 5 (mi)	D. < 5 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The city of Atlantic is situated in the floodplains of Troublesome Creek and the East Nishnabotna River. The relief in the river valley is generally flat with slopes of 0 to 3%. The valley is surrounded by rolling hills which are the result of multi-cyclic erosion of glacial till. Cass County in which Atlantic is located is part of an extensive glacial drift plain, mantled with loess that slopes gently toward the southwest.

The suspected source of the PCE contamination is located in a local topographic low with higher ground to the east, west and south. Surface drainage from this point and ground water flow is to the north-northwest to Troublesome Creek located approximately 4000 feet north. Approximate Elevation 1160' above mean sea level.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

° Soil Survey of Cass County, USDA 1969.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
IA	IAD039954300

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO		03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER				
SURFACE WATER				
WASTE				
AIR				
RUNOFF				
SPILL				
SOIL	3	EPA Region VII Lab - CLP	(PCE)	2 to 29 ug/kg
VEGETATION				
OTHER - Soil/Gas	55	FASP - E & E/FIT	(PCE)	0 to 119 ug/l

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE _X_ GROUND _X_ AERIAL

02 IN CUSTODY OF E & E/FIT and EPA Region VII
(Name of organization or individual)

03 MAPS
_X_ YES
___ NO

04 LOCATION OF MAPS
E & E/FIT and EPA Region VII, Kansas City, KS

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

No other field data collected.

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

° Data transmittal of sample series IK994, TDD # F-07-8701-15
° Soil-Gas data/E & E/FIT. Site Investigation of Atlantic [illegible] TDD #

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE IA	02 SITE NUMBER IAD039954300

I. CURRENT OWNER(S) Not Applicable

01 NAME		02 D+B NUMBER	
STREET ADDRESS (P.O. BOX, RFD #, ETC.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
NAME		02 D+B NUMBER	
STREET ADDRESS (P.O. BOX, RFD #, ETC.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. BOX, RFD #, ETC.)		04 SIC CODE	
CITY	06 STATE	07 ZIP CODE	

PARENT COMPANY (If applicable)

08 NAME		09 D+B NUMBER	
10 STREET ADDRESS (P.O. BOX, RFD #, ETC.)		11 SIC	
12 CITY	13 STATE	14 ZIP CODE	
08 NAME		09 D+B NUMBER	
10 STREET ADDRESS (P.O. BOX, RFD #, ETC.)		11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE	
08 NAME		09 D+B NUMBER	
10 STREET ADDRESS (P.O. BOX, RFD #, ETC.)		11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE	

III. PREVIOUS OWNER(S) (List most recent first)

1 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
5 CITY	06 STATE	07 ZIP CODE	
1 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
5 CITY	06 STATE	07 ZIP CODE	
01 NAME		02 D+B NUMBER	
3 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
5 CITY	06 STATE	07 ZIP CODE	

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE IA	02 SITE NUMBER IAD039954300

II. CURRENT OPERATOR (Provide if different from owner)			**OPERATOR'S PARENT COMPANY** (If applicable)		
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. BOX, RFD #, ETC.)	04 SIC CODE		12 STREET ADDRESS (P.O. BOX, RFD #, ETC.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER				

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)			**PREVIOUS OPERATORS' PARENT COMPANIES** (If applicable)		
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD				
01 NAME	02 D+B NUMBER		10 NAME	11 D & B Number	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD				
01 NAME	02 D+B NUMBER		10 NAME	11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD				

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE IA	02 SITE NUMBER IAD039954300

II. ON-SITE GENERATOR Not Applicable

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. BOX, RFD #, ETC.)	04 SIC CODE	
05 CITY	06 STATE / 07 ZIP CODE	

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE IA	02 SITE NUMBER IAD039954300

II. PAST RESPONSE ACTIVITIES

01 X A. WATER SUPPLY CLOSED — 02 DATE 8-82 — 03 AGENCY IDNR
04 DESCRIPTION
Well #7 has been pumped to waste since PCE was first detected in the well (8-82) at a concentration of 170 ug/l.

01 ___ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ D. SPILLED MATERIAL REMOVED — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ E. CONTAMINATED SOIL REMOVED — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ F. WASTE REPACKAGED — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ G. WASTE DISPOSED ELSEWHERE — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ H. ON SITE BURIAL — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ I. IN SITU CHEMICAL TREATMENT — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ K. IN SITU PHYSICAL TREATMENT — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ L. ENCAPSULATION — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ M. EMERGENCY WASTE TREATMENT — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ N. CUTOFF WALLS — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ P. CUTOFF TRENCHES/SUMP — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

01 ___ Q. SUBSURFACE CUTOFF WALL — 02 DATE ___ — 03 AGENCY ___
04 DESCRIPTION

II. PAST RESPONSE ACTIVITIES (Continued)

01 ___R. BARRIER WALLS CONSTRUCTED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___S. CAPPING/COVERING 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___T. BULK TANKAGE REPAIRED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___U. GROUT CURTAIN CONSTRUCTED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___V. BOTTOM SEALED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___W. GAS CONTROL 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___X. FIRE CONTROL 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___Y. LEACHATE TREATMENT 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___Z. AREA EVACUATED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___1. ACCESS TO SITE RESTRICTED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___2. POPULATION RELOCATED 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

01 ___3. OTHER REMEDIAL ACTIVITIES 02 DATE _____ 03 AGENCY _____
04 DESCRIPTION

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA	POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 11 - ENFORCEMENT INFORMATION	I. IDENTIFICATION 01 STATE: IA 02 SITE NUMBER: IAD039954300

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION X YES ___ NO

2 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT

The Atlantic Municipal Utilities Water Division is routinely monitored by the IDNR (formerly the Iowa Department of Water, Air, and Waste Management). The IDNR recommended in December, 1986 that AMU continue pumping well #7 to waste and that AMU develop additional wells outside the area of contamination, or to consider options to effectively treat the drinking water. The IDNR required the AMU to prohibit well #7 as a source of drinking water and to submit water samples from the well field every three months.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA Files

APPENDIX C

NATIONAL CLIMATIC CENTER PRECIPITATION DATA

1 Tape readability is guaranteed to original purchaser provided that the National Climatic Data Center furnished the blank tape and the user attempts to read the tape and notify NCDC of any problems within 60 days of receipt.

2 The program you are receiving is a copy of an active piece of software on the UNIVAC 1100 System used by the National Climatic Data Center for its internal use and as such is in the public domain. The fee paid to receive this program covers only the cost of transfer of the source code to your desired output medium. Since this center is not a software broker, we do not:

a. Provide support in making the program run on your system.
b. Automatically provide possible changes or updates made to enhance the program.

4 The National Climatic Data Center considers that, in some cases, the reported values on Cooperative Climatological Observation forms, January 1982 and later, are questionable due to recording errors. The best estimates of observed values may be obtained from our Climatological Data publication or from our digital data files.

5 The National Climatic Data Center considers the accuracy of the solar radiation data you have requested to be questionable. The best estimates of observed solar radiation consist of data prior to 1981 which may be obtained from our magnetic tapes in the SOLMET format.

6 IF PAYMENT IS MADE BY CHECK, IT MUST BE DRAWN ON A UNITED STATES BANK OR A U. S. BRANCH OF A FOREIGN BANK, PAYABLE IN UNITED STATES CURRENCY. INTERNATIONAL MONEY ORDERS OR UNESCO COUPONS ALSO ARE ACCEPTABLE AS PAYMENT. PLEASE INCLUDE PAYMENT FOR ANY RUSH OR SPECIAL MAILING CHARGES WHEN REQUIRED. IF YOU PLAN TO SEND VIA "ELECTRONIC TRANSFER", WIRE DIRECTLY TO: FIRST UNION NATIONAL BANK, CHARLOTTE, NC; ROUTING TRANSIT CODE 0530-00219. PLEASE ADD AN ADDITIONAL $6.50 TO YOUR ORDER FEE TO COVER FIRST UNION'S SERVICE CHARGE.

7 Since no weather records are received for your specified area, we are substituting available data of the type desired from the nearest reporting station. Because of the distances involved or differences in terrain features, these data may not be completely representative.

8 If assistance is needed in the application of the data on these records, a list of addresses for private consulting meteorologists may be obtained from:

The American Meteorological Society
45 Beacon Street
Boston, MA 02108

9

URGENT

Regulations will not permit the National Climatic Data Center to absorb cost for services provided customers on a reimbursable basis. UNTIL WE RECEIVE PAYMENT, OR JUSTIFICATION FOR NON-PAYMENT WE WILL NOT BE ABLE TO HONOR FUTURE REQUESTS FOR DATA. Should your records show that payment has been made for this invoice, please send proof of payment. We prefer to remove your name from our past-due accounts RATHER THAN TURN IT OVER TO THE NOAA OFFICE OF GENERAL COUNSEL FOR COLLECTION.

10 Excess payment may be used as automatic credit on future orders or refunded upon request only.

(NOTE: Customer number must be used when placing an order, when checking on order status, or when requesting a refund.)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NCC FORM 5443

ANNUAL CLIMATOLOGICAL SUMMARY

ENVIRONMENTAL DATA SERVICE
NATIONAL CLIMATIC CENTER
NOAA FORM 27-326 (11-74)

STATION NUMBER: 13 0364 07 ATLANTIC 1 NE IOWA ELEVATION 0 1195 FT. ABOVE SEA-LEVEL. LAT.: 41° 25' N: LONG.: 95° 00' 00"

DATE		TEMPERATURES (°F.)													PRECIPITATION (INCHES)									
											NUMBER OF DAYS								SNOW, SLEET			NO. OF DAYS			
YR.	MO.	MEAN MAXIMUM	MEAN MINIMUM	MEAN	DEPART. FROM NORMAL	DEGREE DAYS	HIGHEST	DATE	LOWEST	DATE	MAX. ≥ 90°	MAX. ≤ 32°	MIN. ≤ 32°	MIN. ≤ 0°	TOTAL	DEPART. FROM NORMAL	GREATEST OBSERVED DAY	DATE	TOTAL FALL	GREATEST DEPTH	DATE	≥ .10	≥ .50	≥ 1.00	
80	01	30.6	14.1	22.4	2.2	1316	55	13	- 16	31	0	18	30	6	1.15	.30	.85	16		4	31+	2	1	0	0
80	02	28.4	11.5	20.0	- 5.3	1298	41	26	- 17	1	0	19	29	6	.42	- .55	.15	4		4	8+	2	0	0	0
80	03	43.1	23.2	33.2	- 1.5	977	62	19+	- 3	1	0	7	24	3	.75	- 1.31	.33	28	3.5			3	0	0	0
80	04	64.9	35.4	50.2	.4	451	90	22	22	13	1	0	11	0	1.25	- 1.63	.47	3	.0	0		4	0	0	12
80	05	75.7	45.8	60.8	.0	184	88	29	24	9	0	0	3	0	1.96	- 2.31	.72	17	.0	0		6	1	0	56
80	06	84.1	60.0M	72.1M	2.4	13	101	27	46	8	8	0	0	0	6.83	1.74	2.01	6	.0	0		6	4	3	236
80	07	91.6	66.3	79.0	4.7	0	100	14+	50	27	19	0	0	0	2.87	- .70	1.37	5	.0	0		8	2	1	444
80	08	87.6	64.4	76.0	3.4	0	97	9	52	5	10	0	0	0	6.55	2.64	1.82	16	.0	0		9	4	3	348
80	09	79.2	52.6	65.9	2.3	92	92	8+	29	26	4	0	3	0	.63	- 2.69	.25	25	.0	0		3	0	0	126
80	10	63.3	33.6	48.5	- 5.1	506	85	8	14	29+	0	0	12	0	1.72	- .30	.71	16	4.4	4	27	3	2	0	0
80	11	52.2	25.7	39.0	1.5	772	75	6	6	25	0	0	20	0	.10	- 1.15	.10	13	.0	0		1	0	0	0
80	12	35.2	16.0	25.6	.1	1215	59	5	- 11	25	0	10	30	3	.55	- .30	.41	7	.5	1	24+	1	0	0	0
80	ANN.	61.3	37.4M	49.4M	.4	6824	101	6	- 17	2	42	54	162	18	24.78	- 6.26	2.01	6		4	10+	48	14	7	1222
		ANNUAL MEANS				SUM	ANNUAL EXTREMES				ANNUAL SUMS						EXTREME		SUM	EXTREME		SUMS			
		SUM	SUM	SUM	NORMAL	DEP.	DIFF.	ERROR							NORMAL	DEP.	DIFF.	ERROR							

"M" : MISSING DAYS
"+" AFTER DATE : ALSO OTHER DAYS
"T" : TRACE

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NCC FORM 5443

ANNUAL CLIMATOLOGICAL SUMMARY

ENVIRONMENTAL DATA SERVICE
NATIONAL CLIMATIC CENTER
NOAA FORM 27-326 (11-74)

STATION NUMBER: 13 0364 07 ATLANTIC 1 NE IOWA ELEVATION 1195 FT. ABOVE SEA-LEVEL. LAT.: 41° 25' N: LONG.: 95° 00' W

DATE		TEMPERATURES (°F.)									NUMBER OF DAYS				PRECIPITATION (INCHES)				SNOW, SLEET			NO. OF DAYS			
YR.	MO.	MEAN MAXIMUM	MEAN MINIMUM	MEAN	DEPART. FROM NORMAL	DEGREE DAYS	HIGHEST	DATE	LOWEST	DATE	MAX. ≥ 90°	MAX. ≤ 32°	MIN. ≤ 32°	MIN. ≤ 0°	TOTAL	DEPART. FROM NORMAL	GREATEST OBSERVED DAY	DATE	TOTAL FALL	GREATEST DEPTH	DATE	≥ .10	≥ .50	≥ 1.00	
81	01	36.9	10.5	23.7	3.5	1274	66	24	- 10	10	0	11	31	5	.34	- .51	.30	31	5.0	5	31	1	0	0	0
81	02	M	M	M	M	M	M		M		0				E .73	- .24									0
81	03	M	M	M	M	M	M		M		0				E 1.06	- 1.00								0	0
81	04	72.6	45.1	58.9	9.1	221	90	25	22	15	1	0	6	0	1.43	- 1.45	.43	22	.0	0		6	0	0	43
81	05	71.8	45.9M	58.9M	- 1.9	218	85	31	27	11	0	0	2	0	2.41	- 1.86	1.07	4	.0	0		6	1	1	27
81	06	84.9	59.6	72.3	2.6	6	96	7	47	19	6	0	0	0	4.72	- .37	1.66	2	.0	0		5	3	2	230
81	07	84.1	63.8	74.0	- .3	17	98	14+	52	29+	8	0	0	0	3.52	- .05	.94	25	.0	0		8	2	0	302
81	08	80.2	58.2	69.2	- 3.4	26	88	4	41	19	0	0	0	0	4.73	.82	1.22	2	.0	0		10	3	1	165
81	09	78.5	51.7	65.1	1.5	77	92	29	33	18	2	0	0	0	2.36	- .96	1.20	7	.0	0		2	2	1	87
81	10	61.0	38.1	49.6	- 4.0	470	77	5	16	26+	0	0	9	0	3.58	1.56	1.26	17	.0	0		4	3	1	0
81	11	51.0	29.8	40.4	2.9	732	64	17	14	21	0	2	19	0	2.19	.94	.85	30				5	2	0	0
81	12	30.6M	12.3M	21.5M	- 4.0	1333	49	7	- 22	19	0	16	31	7	1.25	.40	.85	1	9.7			2	1	0	0
81	ANN.						98	7			17				28.32E	- 2.72	1.66	6							854
		ANNUAL MEANS				SUM	ANNUAL EXTREMES				ANNUAL SUMS						EXTREME		SUM	EXTREME		SUMS			
		SUM	SUM	SUM	NORMAL	DEP.	DIFF.	ERROR							NORMAL	DEP.	DIFF.	ERROR							

"M" : MISSING DAYS
", " AFTER DATE : ALSO OTHER DAYS
"T" : TRACE

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ANNUAL CLIMATOLOGICAL SUMMARY

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STATION IDENTIFICATION

13070364 ATLANTIC 1 NE IOWA ELEVATION 1195 FT. ABOVE SEA LEVEL LAT. 41 25N LONG. 95 0W

DATE		TEMPERATURE (°F)														PRECIPITATION (INCHES)									
												NUMBER OF DAYS								SNOW, SLEET			NO. OF DAYS		
YR.	MO.	MEAN MAXIMUM	MEAN MINIMUM	MEAN	DEPART. FROM NORMAL	HEATING DEGREE DAYS	COOLING DEGREE DAYS	HIGHEST	DATE	LOWEST	DATE	MAX ≥ 90°	MAX ≤ 32°	MIN ≤ 32°	MIN ≤ 0°	TOTAL	DEPART. FROM NORMAL	GREATEST OBSERVED DAY	DATE	TOTAL FALL	MAX DEPTH	DATE	≥ .10	≥ .50	≥ 1.0
82	1	17.8	-2.2	7.8	-12.4	1771	0	35	29•	-27	10	0	29	31	21	1.75M	M	1.00	22	12.5	M		5	1	1
82	2	M	M	M				M		M		M	M	M	M	M	M			M	M		M	M	M
82	3	42.9	23.3	33.1	-1.6	976	0	64	31	-12	7	0	7	23	3	3.48	1.42	1.47	19	6.0	6	4	5	2	2
82	4	58.1	32.7	45.4	-4.4	582	3	81	2	6	6	0	2	14	0	1.22	-1.66	.52	16	3.0	2	5	4	1	0
82	5	72.1	52.7	62.4	1.6	117	42	86	4	32	1	0	0	1	0	7.24	2.97	1.48	5	.0	0		13	5	2
82	6	76.9	54.0	65.5	-4.2	64	85	90	28	41	1	1	0	0	0	2.59	-2.50	.85	30	.0	0		6	2	0
82	7	87.5	63.3	75.4	1.1	0	330	96M	4	49M	31	10	0	0	0	2.28	-1.29	.90	2	.0	0		5	2	0
82	8	80.0	61.0	70.5	-2.1	26	205	96	3	44	28	4	0	0	0	6.17	2.26	3.09	5	.0	0		7	4	2
82	9	72.9	52.5	62.7	-.9	146	82	84M	11	30M	21	0	0	2	0	3.63	.31	1.73	13	.0	0		5	2	1
82	10	62.9	40.0	51.5	-2.1	418	7	80M	1	20M	21	0	0	6	0	2.24	.22	.57	2	.0	0		8	2	0
82	11	44.6	26.3	35.5	-2.0	879	0	62	11•	4	24	0	5	21	0	1.74	.49	1.04	11	.0	0		4	1	1
82	12	37.1	19.9	28.5	3.0	1123	0	60	1	-4	12	0	11	27	3	3.54	2.69	1.25	28	5.0	5	31•	8	2	1
	ANN.	M	M	M	M	M	M	96M	AUG•	M		15M	54M	125M	27M		M	3.09M	AUG	26.5M	6M	MAR	70M	24M	10M

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YR.	MO.	MEAN MAXIMUM	MEAN MINIMUM	MEAN	DEPART. FROM NORMAL	HEATING DEGREE DAYS	COOLING DEGREE DAYS	HIGHEST	DATE	LOWEST	DATE	MAX ≥ 90°	MAX ≤ 32°	MIN ≤ 32°	MIN ≤ 0°	TOTAL	DEPART. FROM NORMAL	GREATEST OBSERVED DAY	DATE	TOTAL FALL	MAX DEPTH	DATE	≥ .10	≥ .50	≥ 1.0
83	1	30.4	16.4M	23.4M	5.5	1278B	0B	47	13	1	18+	0	20	30	0	.60	-.16	.26	10	2.9	0T	9+	2	0	0
83	2	36.3	21.0	28.7	4.6	1012	0	58	28	-20	7	0	9	26	2	.97	.00	.37	2	11.5	M		4	0	0
83	3	43.4	27.1	35.3	.5	916	0	79	3	11	21	0	7	23	0	4.55	2.48	.85	25	7.8	0		10	5	0
83	4	52.4	32.7	42.6	-7.2	666	0	77	26	22	15	0	0	16	0	1.57	-1.43	.42	9	2.0	0		5	0	0
83	5	68.5M	44.0	56.3M	-4.8	278B	19B	87	27	28	8	0	0	2	0	5.83	1.92	2.50	1	.0	0		12	3	1
83	6	81.7	58.0	69.9	-.4	35	189	92	23	33	6	3	0	0	0	4.39	.22	.94	29	.0	0		10	4	0
83	7	90.7	65.9	78.3	3.9	0	420	101	22	51	26	16	0	0	0	1.56	-1.81	1.45	29	.0	0		1	1	1
83	8	93.6	66.9	80.3	8.4	0	483	101	17+	53	12	25	0	0	0	.78	-3.27	.64	21	.0	0		1	1	0
83	9	82.6	52.0	67.3	4.0	107	182	97	9+	23	23	10	0	3	0	2.91	-.85	1.29	20	.0	0		4	2	2
83	10	62.2	41.0	51.6	-.8	432	24	88	2	29	17	0	0	7	0	2.75	.58	1.13	11	.0	0		8	1	1
83	11	45.5	30.7	38.1	.9	799	0	70	2	7	25	0	5	18	0	3.67	2.31	.73	9	5.0	1	12	7	3	0
83	12	12.8	-2.2	5.3	-19.7	1848	0	30	11+	-33	19	0	31	31	15	1.76	.98	.43	21	17.3	M		7	0	0
	ANN.	58.3M	37.8M	48.1M	-.4	7371B	1317B	101	AUG+	-33	DEC	54	72	156	17	31.34	.97	2.50	MAY	46.5	1M	NOV	71	20	5

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												NUMBER OF DAYS							SNOW, SLEET			NO. OF DAYS		
YR.	MO.	MEAN MAXIMUM	MEAN MINIMUM	MEAN	DEPART. FROM NORMAL	HEATING DEGREE DAYS	COOLING DEGREE DAYS	HIGHEST	DATE	LOWEST	DATE	MAX ≥ 90°	MAX ≤ 32°	MIN ≤ 32°	MIN ≤ 0°	TOTAL	DEPART. FROM NORMAL	GREATEST OBSERVED DAY	DATE	TOTAL FALL	MAX DEPTH	DATE	≥.10	≥.50	≥1.0
84	1	25.2	4.4	14.8	-3.1	1553	0	43	5	-28	18	0	19	31	12	.85	.09	.75	1	8.0	M		1	1	0
84	2	42.0	23.4	32.7	8.6	929	0	63	22	-8	5	0	4	27	2	.47	-.50	.39	18	.07	0T	29*	1	0	0
84	3	37.9	21.9	29.9	-4.9	1082	0	55	25	-7	9	0	12	29	1	1.87	-.20	.52	19	10.0	0T	31*	5	1	0
84	4	55.7	36.6	46.2	-3.6	563	5	81	26	21	1	0	0	8	0	7.71	4.71	2.61	29	.0	0		10	5	2
84	5	69.0	46.2	57.6	-3.5	243	22	84	17	31	1	0	0	1	0	4.51	.60	1.72	25	.0	0		8	3	1
84	6	83.3	60.7	72.0	1.7	5	220	91	26*	43	3	2	0	0	0	6.40	2.23	1.34	15	.0	0		12	5	2
84	7	88.0	61.0	74.5	.1	2	305	99	9	45	7	11	0	0	0	4.08	.71	2.67	15	.0	0		6	2	1
84	8	88.4	60.4	74.4	2.5	8	308	100	28	43	23	13	0	0	0	.62	-3.43	.28	21*	.0	0		2	0	0
84	9	75.5	49.2	62.4	-.9	184	113	96	1	20	29	6	0	3	0	2.33	-1.43	.68	2	.0	0		5	2	0
84	10	63.2	41.8	52.5	.1	384	5	80	3	21	23	0	0	10	0	4.83M	M	1.76	15	.0	0		10	3	1
84	11	50.1	27.9	39.0	1.8	775	0	66	8	12	20	0	0	23	0	.67	-.69	.55	1	1.0	0		1	1	0
84	12	37.4	16.6	27.0	2.0	1170	0	65	28	-7	25	0	14	29	3	3.46	2.68	.65	24	6.0M	0T	31*	7	4	0
	ANN.	59.6	37.5	48.6	.1	6898	978	100	AUG	-28	JAN	32	49	161	18	37.80M	M	2.67	JUL	25.0M	0M		68	27	7

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85	1	26.0	3.6	14.8	-3.1	1550	0	44	6	-23	20	0	22	31	13	.42	-.34	.15	9	6.0	M		2	0	0
85	2	29.5	9.5	19.5	-4.6	1271	0	53	28	-23	6	0	15	26	9	1.08	.11	.64	21	6.0	M		4	1	0
85	3	53.3	28.7	41.0	6.2	734	0	73	18	16	5	0	1	23	0	1.91	-.16	.44	23	8.0	8	31	6	0	0
85	4	66.7	42.0	54.4	4.6	347	37	87	18	16	1	0	0	7	0	2.91	-.09	.77	30	.0	0		8	1	0
85	5	77.3	51.2	64.3	3.2	78	62	88	26	39	18	0	0	0	0	2.41	-1.50	.62	20	.0	0		7	2	0
85	6	81.3	53.8	67.6	-2.7	37	121	102	8	38	13	2	0	0	0	3.13	-1.04	1.30	17	.0	0		5	3	1
85	7	86.6	60.5	73.6	-.8	0	274	94	9	47	16	12	0	0	0	4.29	.92	3.00	19	.0	0		4	2	1
85	8	80.0	57.1	68.6	-3.3	12	129	91	31	46	18	3	0	0	0	3.15	-.90	.82	14	.0	0		5	4	0
85	9	71.9	54.4M	63.2M	-.1	200B	147B	93	7+	33	29	5	0	0	0	3.80	.04	1.02	29	.0	0		10	3	1
85	10	62.7	41.0	51.9	-.5	400	1	74	22	25	14	0	0	5	0	3.02	.85	1.00	18	.0	0		7	3	1
85	11	37.0	19.4	28.2	-9.0	1095	0	67	18	-1	21+	0	13	26	2	.72	-.64	.20	15	5.5	3	19	4	0	0
85	12	24.2	3.0	13.6	-11.4	1587	0	40	26+	-18	18	0	22	31	15	.63	-.15	.42	1	8.0M	M		2	0	0
	ANN.	58.0	35.3M	46.7M	-1.8	7311B	771B	102	JUN	-23	FEB+	22	73	149	39	27.47	-2.90	3.00	JUL	33.5M	8M	MAR	64	19	4

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86	1	40.4	17.2	28.8	10.9	1115	0	58	20	-3	6	0	3	30	2	.00	-.76	.00	31+	.0	0		0	0	0
86	2	29.8	9.1	19.5	-4.6	1270	0	54	2	-24	12	0	18	27	9	2.09	1.12	1.44	4	M	M		4	1	1
86	3	54.7	29.3	42.0	7.2	711	6	90	29	8	7	1	1	23	0	3.06	.99	1.08	12	.0	0		4	4	1
86	4	64.4	40.0	52.2	2.4	383	6	82	25	24	22	0	0	7	0	7.24	4.24	1.60	3	.0	0		11	4	3
86	5	72.9	50.7M	61.8M	.7	130B	36B	85	31+	36	2	0	0	0	0	5.63	1.72	2.02	10	.0	0		7	4	2
86	6	84.1	62.5	73.3	3.0	0	258	93	27	51	3	8	0	0	0	5.92	1.75	1.88	21	.0	0		8	5	2
86	7	85.8	65.7	75.8	1.4	0	340	92	28+	54	21	10	0	0	0	8.53	5.16	2.65	8	.0	0		9	6	3
86	8	77.9	57.5	67.7	-4.2	34	125	87	25+	45	27+	0	0	0	0	2.61	-1.44	1.08	13	.0	0		5	2	1
86	9	75.9	57.1	66.5	3.2	55	110	87	21	36	8	0	0	0	0	8.72	4.96	2.01	15	.0	0		14	5	2
86	10	62.8	41.7	52.3	-.1	388	0	77	7	25	14	0	0	4	0	4.36	2.19	2.08	11	.0	0		8	2	1
86	11	M	M	M				M		M		M	M	M	M	M	M			M	M		M	M	M
86	12	34.3	19.4	26.9	1.9	1176	0	46	23	-7	13	0	11	31	2	.92	.14	.39	7	1.0	M		3	0	0
	ANN.	M	M	M	M	M	M	93M	JUN	M		19M	33M	122M	13M	M	M	2.65M	JUL	1.0M	0M		73M	33M	16M

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U.S. DEPARTMENT OF COMMERCE
NOA ERIC STR. IAL RSE

STATE: IOWA | COUNTY: Cass | RIVER:

TIME (local) OF OBSERVATION: CST | TEMP.: 11 AM | PRECIPITATION: 11 AM | STANDARD TIME IN USE: CST

TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

Atlantic

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

Punched 13617

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths)	Snow, ice pellets hail (ins. and tenths)	At Ob. Snow, ice pellets hail, ice on ground (ins.)	Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___ A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	33	29	23			0											
2	37	11	26														
3	36	26	31														
4	36	26	27														
5	40	25	30														
6	37	29	31														
7	32	27	29														
8	38	18	21														
9	35	21															
10	24	19	21	TRC	T	0											
11	47	15	35														
12	57	22	29														
13	62	27	35														
14	45	24	30														
15	22	14	14														
16	23	8	19														
17	25	14	22	TRC	T	0											
18	34	9	14														
19	35	2	17														
20	34	10	24														
21	42	21	21														
22	22	2	2														
23	11	-10	-4														
24	26	-4	16														
25	25	8	19														
26	32	17	26														
27	46	15	21														
28	49	34	40														
29	49	34	22														
30	44	17	18.														
31	57.	18	40														
SUM			SUM	T	T			Fog	Ice Pel.	Glaze	Thund	Hail	Dam. Winds	SUM			
				Greatest													

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING	DATE

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

Punched 66835

N (C ical) iver if dif | SFO 5 7-79 | U.S TME COMM STRA ERIC AL V R SE

STATE: IOWA | COUNTY: CASS | RIVER: [illegible] 8

TIME (local) OF OBSERVATION RIVER: 11 AM | TEMP.: 11 AM | PRECIPITATION: 11 AM | STANDARD TIME IN USE: CST

TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	58	20	25			0													
2	62	24	32																
3	37	22	32																
4	40	28	36																
5	37	30	33																
6	52	23	32																
7	64	21	41																
8	45	17	17																
9	44	9	34																
10	55	14	30																
11	45	19	20																
12	49	14	27																
13	55	19	44																
14	55	19	30																
15	35	26	31																
16	35	26	27																
17	37	19	24																
18	37	12	13																
19	43	10	24																
20	45	15	17																
21	51	13	23	T															
22	41	18	24																
23	51	10	34																
24	51	29	34																
25	52	28	35																
26	56	28	37																
27	40	33	38																
28	38	33	33	.54															
29	54																		
30																			
31																			
SUM			SUM	.54 Greatest	0												SUM		

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING	DATE

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

ATLANTIC [illegible] — MONTH: MARCH 19 82

U.S. DEPARTMENT OF COMMERCE — NATIONAL WEATHER SERVICE

Atlantic Ia

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

STATE	COUNTY	RIVER
IA.	CASS	

TIME (local) OF OBSERVATION RIVER	TEMP.	PRECIPITATION	STANDARD TIME IN USE
	11 PM	11 PM	CST

TYPE OF RIVER GAGE	ELEVATION OF RIVER GAGE ZERO	FLOOD STAGE	NORMAL POOL STAGE
	Ft.	Ft.	Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___ A.M.	TENDENCY	REMARKS (Special observations, etc.)
1	39	27	27			0											
2	38	33	36														
3	64	20	26														
4	69	35	36														
5	71	26	42														
6	73	29	54														
7	72	39	34														
8	57	27	38														
9	34	23	23														
10	35	3	27														
11	48	15	36														
12	51	27	37	.04													
13	67	30	51														
14	63	30	38	.02													
15	38	34	34	.07													
16	42	34	42	trace													
17	43	39	41	.22													
18	46	36	39	.97													
19	59	31	46	—													
20	68	44	51														
21	56	34	34	.17													
22	70	28	56														
23	73	51	38	.09													
24	57	42	42	.68													
25	48	38	38	.02													
26	46	30	31														
27	58	31	44	.18	[illegible]												
28	~~34~~ 44	23	23	.43	2.0	M											
29	27	14	14	.10	3.0	M											
30	31	15	15			M											
31	45	13	37			T											
SUM			SUM	2.99	5.0		Fog	Ice Pel.	Glaze	Thund	Hail	Dam. Winds	SUM				
			Greatest		6.0												

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING	DATE

CONDITION OF RIVER AT GAGE

- A. Obstructed by rough ice.
- B. Frozen, but open at gage.
- C. Upper surface of smooth ice.
- D. Ice gorge above gage.
- E. Ice gorge below gage.
- F. Shore ice.
- G. Floating ice.
- H. Pool stage.

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

Punched 66835

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RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

ATLANTIC FK 37

STATE	COUNTY	RIVER
IOWA	CASS	

TIME (local) OF OBSERVATION	TEMP.	PRECIPITATION	STANDARD TIME IN USE
	11 AM	11 AM	CST

TYPE OF RIVER GAGE	ELEVATION OF RIVER GAGE ZERO Ft.	FLOOD STAGE Ft.	NORMAL POOL STAGE Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___ A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	44	29	29			D												
2	37	22	25															
3	46	17	26															
4	53	17																
5	64	21	55															
6	65	27	48															
7	23	26	37															
8	76	26	40															
9	77	30	53															
10	68	36	41															
11	47	33	34	.81														
12	65	27	50															
13	57	46	46	.31														
14	50	46	48	.94														
15	52	44	44	.11														
16	78	37	54															
17	81	40	60															
18	81	48	60															
19	87	60	81															
20	81	54	54															
21	54	46	47															
22	46	42	43	.07														
23	74	38	54															
24	73	44	59															
25	84	53																
26	92	47																RECORD HIGH (OLD RECORD 88 1981)
27	75	47	48															
28	81	32	69															
29	83	57	62															
30	73	42	50															
31																		
SUM			SUM	1.44	0	X												
				Greatest				Fog	Ice Pel.	Glaze	Thund	Hail	Dam. Winds	SUM			X	

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING	DATE

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

Punched 13617

STATION (Climatological) LL C (River Station if di...) 14 B

STATE: IOWA | COUNTY: CASS | RIVER:

TIME (local) OF OBSERVATION: RIVER | TEMP. 11PM | PRECIPITATION 11PM | STANDARD TIME IN USE DST

TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

NATIONAL WEATHER SERVICE

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	89	42	73			0											
2	85	59	62	.52													
3	63	54	55	.00	.08												
4	61	48	56	.08													
5	63	49	54	.03													
6	77	41	62														
7	79	43	62														
8	80	40	65														
9	85	56	70														
10	88	59	81														
11	85	64	64														
12	60	47	61														
13	90	55	77														
14	86	62	60														
15	81	46	67														
16	86	51	68														
17	90	60	80														
18	84	62	65														
19	88	53	67	.20													
20	92	62	71	.43													
21	70	49	49	.40													
22	52	42	50														
23	69	46	69														
24	61	53	60	.11"													
25	77	54	70	82"													
26	74	61	65	1.57													
27	71	62	64	.23													
28	79	61	69														
29	77	63	67	.11													
30	80	60	60	TRC													
31	83	57	69	.58													
Sum			SUM	5.55	0			Fog	Ice Pel.	Glaze	Thund.	Hail	Dam. Winds	SUM			
				Greatest													

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING	DATE

OBSERVER: KUAN AM/FM

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

Punched 00749

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STATE	COUNTY	RIVER
FA	CASS	

TIME (local) OF OBSERVATION	TEMP.	PRECIPITATION	STANDARD TIME IN USE
	11AM	11AM	CSST

TYPE OF RIVER GAGE	ELEVATION OF RIVER GAGE ZERO Ft.	FLOOD STAGE Ft.	NORMAL POOL STAGE Ft.

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Atlantic Ia

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and Hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	85	66	68			0												
2	75	56	55	.06														
3	74	51	54															
4	79	42	66															
5	83	60	68															
6	86	58	74															
7	90	66	84															
8	90	64	73															
9	73	63	66	.02														
10	72	64	68	.10														
11	86	63	73	.11														
12	92	59	78															
13	96	58	81															
14	97	71	90															
15	94	70	80															
16	92	68	76															
17	87	70	70															
18	91	70	70															
19	87	71	71															
20	72	63	66															
21	90	60	86															
22	93	70	70															
23	90	65	71															
24	88	61	64	.60														
25	80	62	65	.06														
26	78	62	60															
27	87	58	79															
28	87	55																
29	81	63	63	.06														
30	78	51	67															
31	~~89~~	~~55~~	~~69~~															
Sum			SUM	1.01	0	X	CHECK BAR (For wire-weight) NORMAL CK. BAR	Fog	Ice Pel.	Glaze	Thund	Hail	Dam. Winds	SUM			X	
				Greatest			READING / DATE											

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER

SUPERVISING OFFICE

STATION INDEX NO.

13-0364 -7

Punched 13617

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STATE: IOWA | COUNTY: CASS | RIVER:

TIME (local) OF OBSERVATION RIVER: | TEMP. 11pm | PRECIPITATION 11pm | STANDARD TIME IN USE CDT

TYPE OF RIVER GAGE: | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

Atlantic Ia

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths)	Snow, ice pellets hail (ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (ins.)	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	83	63	63			0											
2	87	55	69	.03													
3	84	62	71														
4	85	62	70	.03													
5	85	64	77														
6	91	64	78	.83													
7	79	62	70	1.32													
8	79	66	71	1.00													
9	85	63	74	~~.07~~ .10													
10	85	65	72	1.21													
11	87	73	80														
12	79	65	65	1.55													
13	72	55	58	.03													
14	75	50	60	.86													
15	87	52	69														
16	87	65	75														
17	86	70	73														
18	85	69	78	.44													
19	89	74	83														
20	90	75	78														
21	90	71	73														
22	86	74	74														
23	89	68	79														
24	91	70	70	.05													
25	92	65	76														
26	93	69	84														
27	92	74	76														
28	93	63	61														
29	93	68	79														
30	95	70	78														
31	95	70	81														
SUM	96	70	SUM	6.42 Greatest	0												

Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved.

A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7 8 9 10 11

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING DATE

Fog | Ice Pel. | Glaze | Thund | Hail | Dam. Winds | SUM

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER KJAN AM FM

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

Punched 88733

STATION (Local): Atlantic | MONTH: Aug | 1987

STATE: Iowa | COUNTY: Cass | RIVER:

TIME (local) OF OBSERVATION RIVER: | TEMP.: 11 P.M. | PRECIPITATION: 11 P.M. | STANDARD TIME IN USE: DST

TYPE OF RIVER GAGE: | ELEVATION OF RIVER GAGE ZERO: Ft. | FLOOD STAGE: Ft. | NORMAL POOL STAGE: Ft.

U.S. DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)
1	96	70	84			0
2	96	71				
3	82	73	73			
4	80	62	79			
5	83	52	83			
6	81	53	68			
7	77	64	70	.02 / .62		
8	79	66	71	4.90		
9	82	60	77			
10	86	56	70			
11	78	62	70			
12	78	68	70	.29		
13	78	67	72	.14		
14	86	67	77	.03		
15	87	69	79			
16	85	71				
17	79	59	70			
18	78	60	62	1.37		
19	75	53	60	.22		
20	83	56	71	.03		
21	92	72	85			
22	64	50	58	.05		
23	71	51	62			
24	64	55	56	.01		
25	58	53	57	2.22		
26	62	55	58	.69		
27	69	55	57			
28	72	49	53			
29	81	48	75			
30	72	56	62			
31	72	45	49			
SUM			SUM	10.57	0	X
				Greatest		

Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M. 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7 8 9 10 11

WEATHER (Calendar Day): Mark 'X' for all types occurring each day. Fog | Ice Pellets | Glaze | Thunder | Hail | Damaging Winds

Time of observation if different from above

RIVER STAGE: CONDITION | GAGE READING AT ___ A.M. | TENDENCY

REMARKS (Special observations, etc.)

CHECK BAR (For wire-weight) NORMAL CK. BAR | READING | DATE

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: KJAN AM/FM

SUPERVISING OFFICE:

STATION INDEX NO. 13-0364 -7

Punched 13617.

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NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

STATE	COUNTY	RIVER
IOWA	CASS	

TIME (local) OF OBSERVATION RIVER	TEMP.	PRECIPITATION	STANDARD TIME IN USE
	11PM	11PM	CDT

TYPE OF RIVER GAGE	ELEVATION OF RIVER GAGE ZERO Ft.	FLOOD STAGE Ft.	NORMAL POOL STAGE Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. 1 2 3 4 5 6 7 8 9 10 11 NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark "X" for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation if different from above	RIVER STAGE CONDITION	GAGE READING AT ___A.M.	TENDENCY	REMARKS (Special observations, etc.,)
1	80	48	61			0											
2	76	46	60														
3	77	55	67														
4	87	60	71														
5	85	46	62	.20													
6	79	57	66	TR.													
7	73	54		.04													
8	73	51	51														
9	74	47	57	.45													
10	76	51	62														
11	71	50	55	.02													
12	68	41	51														
13	75	51	65														
14	82	56	66														
15	66	59		.61													
16	64	57	63	2.20													
17	70	59	64	.28													
18	69	50	50														
19	65	45	60	.105													
20	~~66~~	47	58														
21	68	46	45														
22	67	42	46														
23	80	39	52														
24	82	43	69	—													
25	79	46	60														
26	85	49	71														
27	~~84~~	~~64~~	64														
28	71	46	50														
29	71	42	50														
30	73	42	49														
31																	
SUM			SUM	3.85 Greatest	0	X	CHECK BAR (For wire-weight) NORMAL CK. BAR	Fog	Ice Pel.	Glaze	Thund.	Hail	Dam. Winds	SUM			X

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

READING	DATE

OBSERVER KJAN AM-FM

SUPERVISING OFFICE

STATION INDEX NO. 13-0364 -7

APPENDIX D

WELL LOGS

WELL #1

Well No. 1 Kind of Well Gravel Pack Depth 87'6" Size hole started 12 in.

Finish 12" G. P. M. Static head 16'9" Drawdown

Water was first encountered at 35' in Sand Approximate Amount 15GPM

Remarks Side holes are 8".

40 yards of gravel in hole.

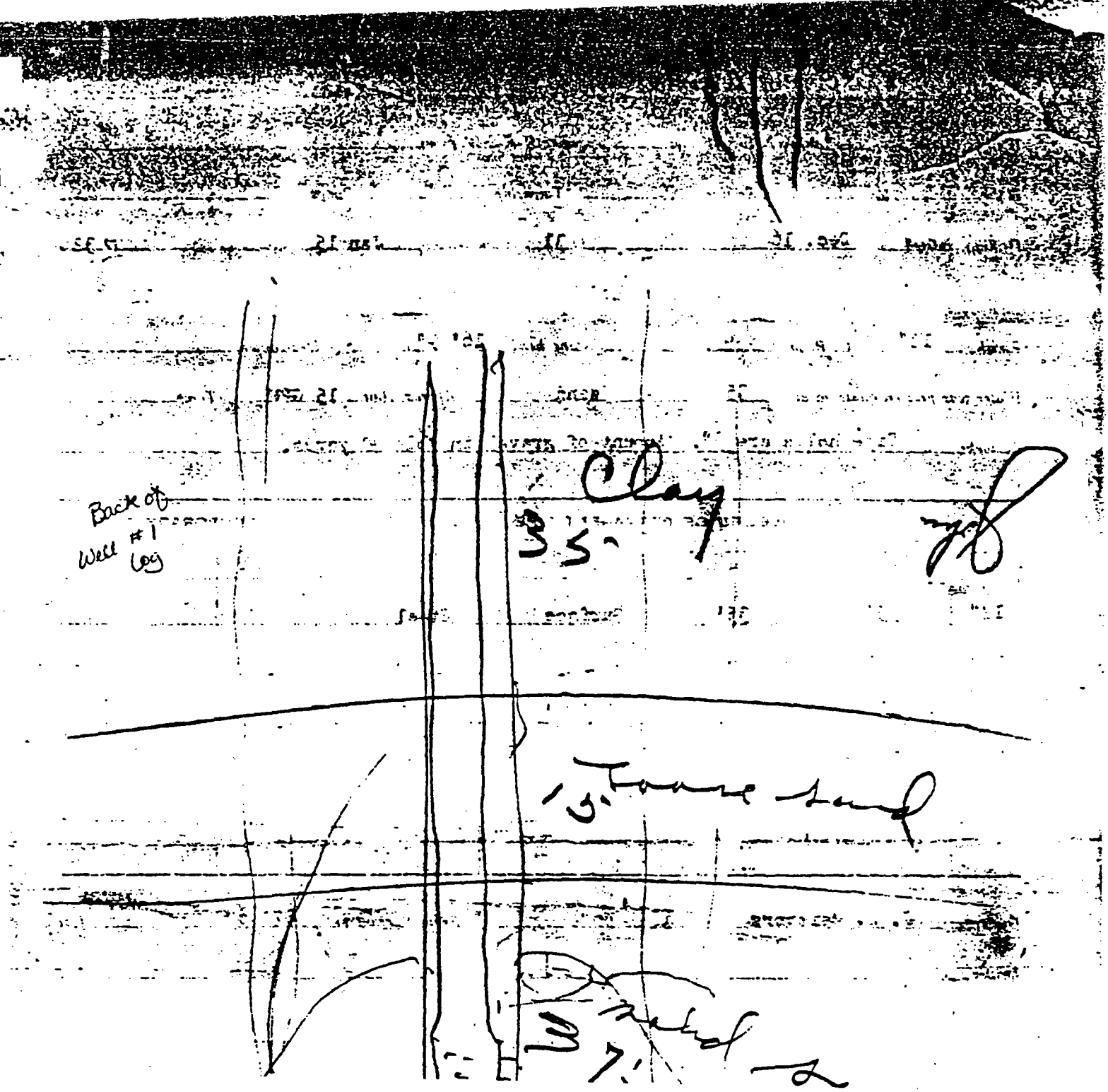
RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
Our well						
12"	35'	35'	Surface			
12"	25'	Strainer	attached to 10" pipe			
10'	43'9"		19'9"	Drive shoe on top		
12	Side holes cased with 8" pipe with drive shoe on bottom					

Driller From Surface to feet

Driller From feet to feet

Driller From feet to feet

AMOUNT IN FEET	KIND OF SOIL OR FORMATION	TOTAL DEPTH FEET
	Log of sideholes- Main hole already drilled	
35	Clay	35
15	Fine sand	50


Back of
Well #1
Log
35'
Clay

THORPE WELL COMPANY

4340 SIXTH AVENUE
DES MOINES, IOWA

Drilled for City of Atlantic *of*

Well is located ____ *miles N-E-S-W and* ____ *miles N-E-S-W from*

in the ____ ¼ ____ ¼ *Section* ____ *Township* ____ *Range* ____

Drilling started Dec. 16 *19* 31 *Completed* Jan 15 *19* 32

~~Dec. 3~~

Well No. 1 *Kind of Well* Gravel packed *Depth* 87' 6" *Size hole started* 12 *in.*

Finish 12" *G. P. M* ____ *Static head* 16' 9" *Drawdown* ____

Water was first encountered at 35 *in* sand *Approx. Amt.* 15 GPM *Temp.* ____

Remarks Side holes are 8". Amount of gravel in hole 40 yards.

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
Our well 12"	35'	35'	Surface	Steel		
12"	25' (Strainer)					
10"	43' 9"		19' 9"	Steel		
10"	1			Drive shoe		
8"	2			Drive shoes		

Driller J. H. Meisters *From Surface to* 87' 6" *feet*

Driller ____ *From* ____ *feet to* ____ *feet*

Well #2

Log from plans - City of Atlantic Water Suppy Files

Side holes 60' deep

Well #2

Amount (ft)		Total depth (ft)
7'	Top Soil	7'
5'	Clay	12'
17'	Sandy blue Clay	29'
6'	Sand & Gravel	35'
46'	Sandstone	81'

THORPE WELL COMPANY

2340 SIXTH AVENUE
DES MOINES, IOWA

Drilled for City Water & Power House at Atlantic, Iowa

Well is located South of Plant miles N-E-S-W and miles N-E-S-W from

in the ¼ ¼ Section Township Range

Drilling started 7-30 1946 Completed 8-2 1946

Well No. 3 Kind of Well Feeder Hole Depth 53' Size hole started 10" in.

Finish 8" G. P. M. Static head Drawdown

Water was first encountered at in Approx. Amt. Temp.

Remarks

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
8"	55'	Set inside hole				
10"	49'	Attached to top of a 12" - 30' long streiner				
1	12"	Cast iron streiner shoe - shop				
This 10" casing on top of streiner is in 5 joints with couplings turned down.						

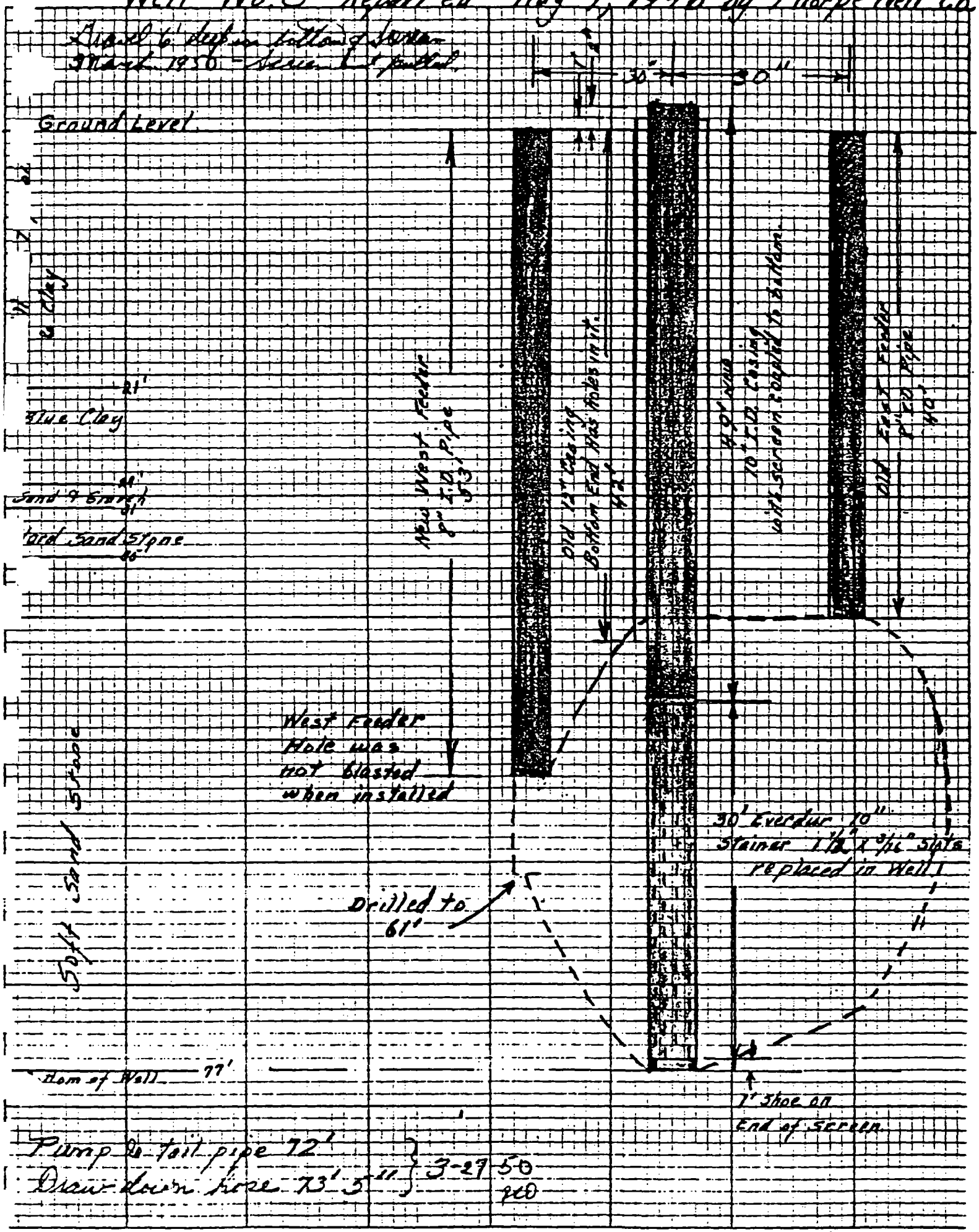
Driller Ed Atcheson From Surface to feet

Driller From feet to feet

Driller From feet to feet

AMOUNT IN FEET	KIND OF SOIL OR FORMATION (BE SPECIFIC)	TOTAL DEPTH FEET
7	Fill Brick & Concrete	7
24	A little of everything mixed together. Loose cavity was found from 7' to 20' - filled it with 3 tons of sand.	31
22	Sandstone	53
	Quit drilling at 60' when gravel broke through between 53' & 55'.	

Well No. 3 Repaired Aug 7, 1946 by Thorpe Well Co



EUGENE DIETZGEN CO NO 375

THORPE WELL COMPANY

2340 SIXTH AVENUE

DES MOINES, IOWA

Drilled for City of Atlantic, Iowa *at* Sunnyside Park

Well is located _____ *miles N-E-S-W and* _____ *miles N-E-S-W from* _____

in the _____ ¼ _____ ¼ *Section* _____ *Township* _____ *Range* _____

Drilling started June 1 *19* 31 *Completed* July 1 *19* 31

Well 1

Well No. 4 *Kind of Well* Thorpe Pat. *Depth* 42 ft. *Size hole started* 48 *in.*

Finish 12" *G. P. M.* 180 *Static head* 15 *Drawdown* 23

Water was first encountered at 25' *in* Sand gravel. *Approx. Amt.* _____ *Temp.* _____

Remarks Well was completed with 21'3" of 12" pipe with 20' 6" of 11" streiner attached. Well was packed with 22 ton of gravel.

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
12"	21' 6"	21' 3"			48"	25'
					42"	40'
					20"	42'

Driller Carl Allen *From Surface to* finish 42 *feet*

Driller _____ *From* _____ *feet to* _____ *feet*

Driller _____ *From* _____ *feet to* _____ *feet*

AMOUNT IN FEET	KIND OF SOIL OR FORMATION (BE SPECIFIC)	TOTAL DEPTH FEET
3	Black Soil	3
15	Yellow Clay	18
2	Dry Sand	20
5	Blue Clay	25
10	Fine Sand	35
5	Gravel and Boulders	40
2	Blue Shale	42

THORPE WELL COMPANY
2340 SIXTH AVENUE
DES MOINES, IOWA

Drilled for Atlantic Water Dept. at Atlantic, Iowa

Well is located 500 ft miles N-E-S-W and miles N-E-S-W from Light Plant

in the ¼ ¼ Section Township Range

Drilling started Aug. 11 19 51 Completed Sept. 15 19 51

Repaired Gravel

Well No. 5 Kind of Well Packed Well Depth 85' from top of 12" pipe. Size hole started in.

Finish 10" G. P. M. Static head 18' Drawdown

Water was first encountered at in Approx. Amt. Temp.

Remarks Old screen in good shape used again. Did not pump this well, repair job. Drilled Side Hole #2, Used carload of gravel. Shot side holes in at 60, 65 & 77' depths. We furnished 57'4" of 8" pipe, no plug on top, & 43'3" of 10" pipe.

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
Side ole #2 8"	57' 4"	55'	2' above Surface	Standard	10"	13'3"
n 12"	31'11"	31'11"	Surface	Standard	6"	75'
creen 12"	25'	84'	59'	Thorpe Everdur		
10"	43'3" (2 joints new)	59'	Surface	Standard		
	1 old joint	13'9"				

Driller E. E. Walker From Surface to 85' on #2 side hole feet

Driller Main hole & #1 side hole drilled in 1932 by Meister From feet to feet

Driller From feet to feet

AMOUNT IN FEET	KIND OF SOIL OR FORMATION (BE SPECIFIC)	TOTAL DEPTH FEET
	#2 Side Hole	
6"	Concrete floor	
6'6"	Cinders, bricks & fill	7
6'	Black dirt top soil	13
22	Dirty sand & clay	35
10	Chalky yellow clay, fine sand	45
30	Fine sand rock	75
10	Sand rock	85

Layne-Western Company Omaha, Nebraska

1. Contract City of Atlantic Date February 4, 1966

2. City and State Atlantic, Iowa Driller Vic Soukup

3. Well No. 6 at test hole No. 66-1 Well location (attach map) North of Troublesome Creek and North of power plant

4. Work completed ____ No of man hours as charged to job on time sheet ____

5. MATERIAL:	LENGTH	DIA.	GAUGE OR WALL THICKNESS	MATERIAL	TYPE	NO. OF OPENINGS
6. Screen	25'	12"	7 ga.	Stainless Steel	Shutter	6
7. Inner Casing	55'	12"	Cast Iron		T & C	
8. Outer Casing						

9. 62 tons of gravel used in the well. Size concrete mix - Fremont

10. Test of well. Did you use test or permanent pump? test 10" Size of Bowl 9 Stages

11. Size of orifice 6 inch by 4 inch. Orifice tube reading ____ inches.

12. Pumping test — measurements from ground level:

TIME	G.P.M.	STATIC	DRAWDOWN	PUMPING LEVEL
1 hr.	130	14' 6"	6'	20' 6"
4 hr.	210	14' 6"	10'	24' 6"
2 hr.	317	14' 6"	14'	28' 6"
1 hr.	517	14' 6"	23' 6"	37' 6"

13. Recovery in 5 minutes full in 10 sec., in 30 minutes ____

14. Did you seal bottom of well? yes Thickness 3/16 inches, material Stainless steel plate

15. Well underreamed? ____ From ____ feet to ____ feet, ____ feet to ____ feet.

16. If all screen was not placed at bottom, state how it was spaced.

From ____ feet to ____ feet; from ____ feet to ____ feet; from ____ feet to ____ feet.

17. Depth of well from ground level to top of plug 75' Size of drilled hole 42"

18. Was cement placed around or between any of the casings? none

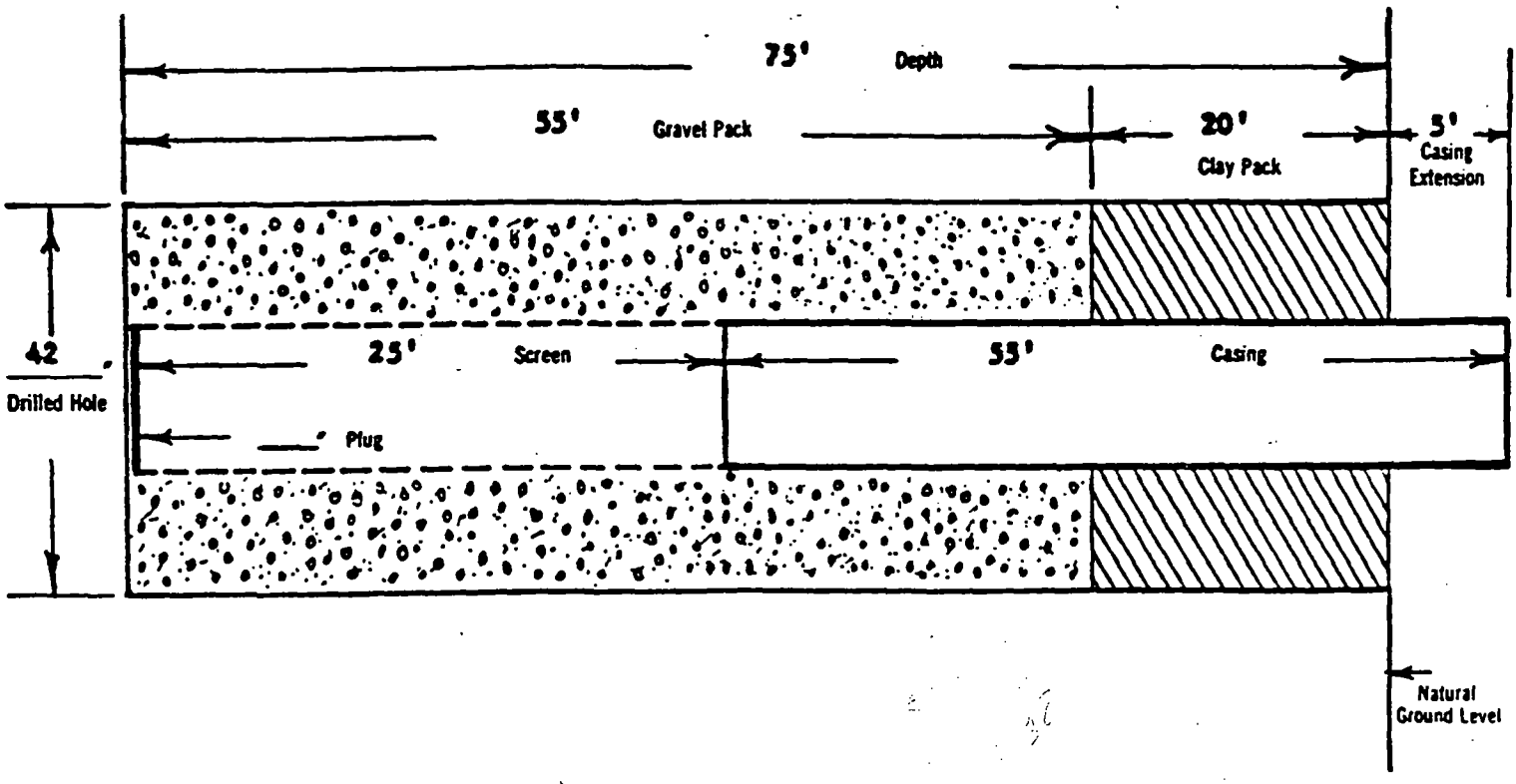
19. If so, state where, how much and method used. ____

Layne-Western Company Omaha, Nebraska

CONTRACT Atlantic, Iowa Well No. 6 6

Log of well from ground level:

Feet		Feet	Formation
	to		
0	to	17	Clay
17	to	29	Coarse sand and gravel
29	to	75	Sandstone, medium to coarse
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		



THORPE WELL COMPANY

2340 SIXTH AVENUE

DES MOINES, IOWA

Drilled for Board of Waterworks & Electric Light & Power Plant Trustees at Atlantic, Iowa

Well is located ____ miles N-E-S-W and ____ miles N-E-S-W from ____

in the ____ ¼ ____ ¼ Section ____ Township ____ Range ____

Drilling started 8/11/42 19__ Completed 10/3/42 19__

Well No. 7 Kind of Well Side hole gravel pack Depth 82'8" Size hole started 16 in.

Finish 12" G. P. M. 222 Static head 24' Drawdown 17'

Water was first encountered at ____ in ____ Approx. Amt. ____ Temp. 51°

Remarks ____

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
12"	60'2"	58'2"	2' above surface		16"	53'
12"	25'	82'8"	57'8"	Thorpe Everdur Screen		
10"	11'5"	57'8"	46'3"	attached to screen		
		SIDE HOLES				
6"	50'	50'	Surface	East side hole		
8"	65'	65'	Surface	North side hole		
10"	42'	42'	Surface	South side hole		

Driller Ray Megrew From Surface to ____ feet

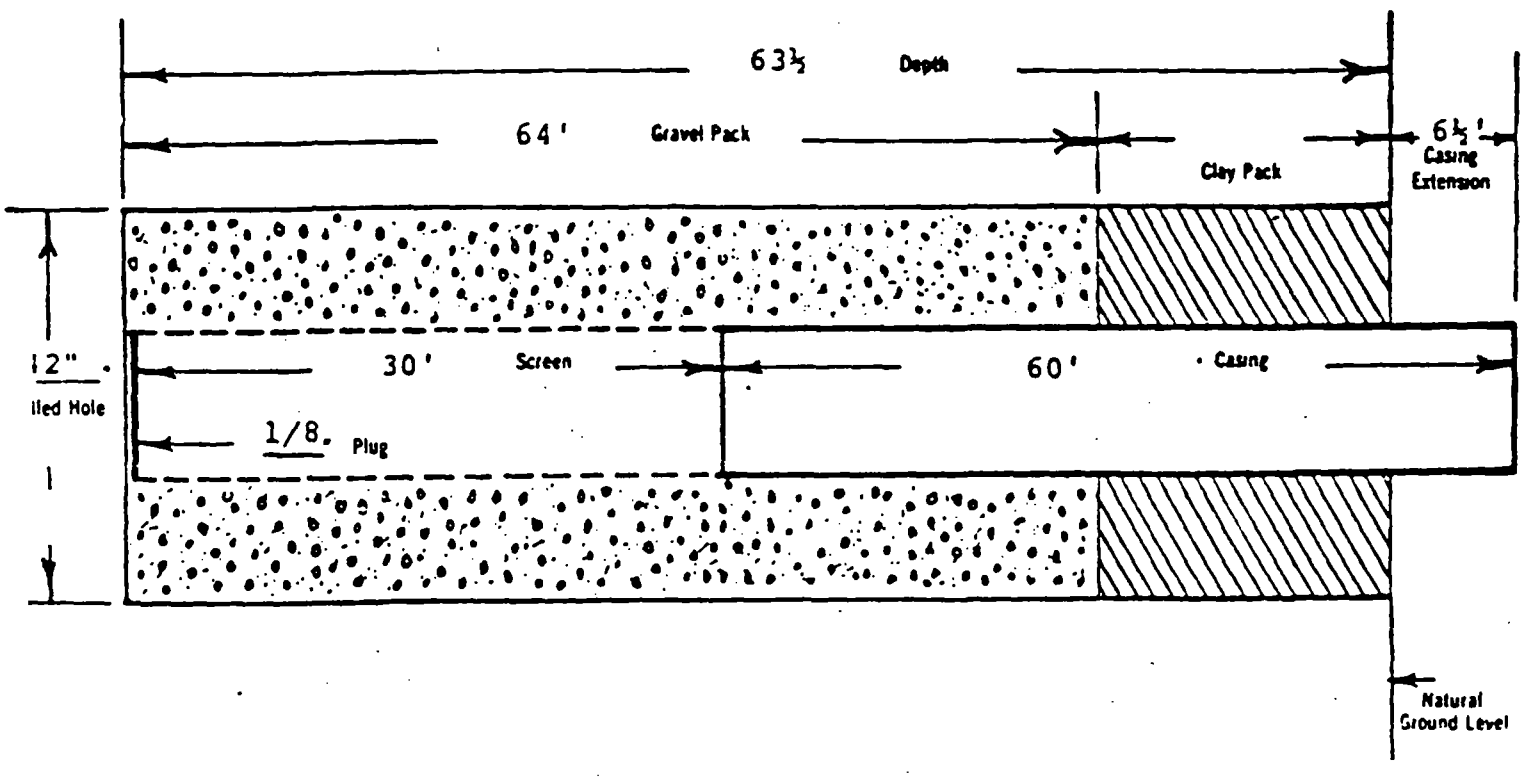
Western Company, Inc. — Well Formation

Omaha, Nebraska

CONTRACT Atlantic, Iowa Well No. 12

of well from ground level:

Feet		Feet	Formation
0	to	3	Top soil, black
3	to	16	Gray & brown clay
16	to	18	Blue clay & sand
18	to	20	Coarse and fine sand, small gravel, blue
20	to	26	Coarse and fine sand, gravel, buff
26	to	31	Coarse and fine sand, gravel, boulders
31	to	38	Dakota sandstone
38	to	40	Yellow shale
40	to	48	Dakota sandstone, fine, tight
48	to	74	Dakota sandstone, medium, loose
74	to	75	Yellow shale
75	to	84	Sandstone, medium, loose
84	to	86	Yellow shale
	to		
	to		
	to		



Layne-Western Company Omaha, Nebraska

1. Contract City of Atlantic Date May 2, 1966

City and State Atlantic, Iowa Driller Dick Farrell

3. Well No. 10 at test hole No. 66-2 Well location (attach map) 680' east of well # 6 in city well field

4. Work completed May 2, 1966 No of man hours as charged to job on time sheet

5. MATERIAL:	LENGTH	DIA.	GAUGE OR WALL THICKNESS	MATERIAL	TYPE	NO. OF OPENINGS
6. Screen	25'	12"	7 ga.	Stainless steel	Shutter	5
7. Inner Casing	57' 6"	12"	.6	Cast Iron	T & C	
8. Outer Casing						

9. 20 yds ~~tons~~ of gravel used in the well. Size Road & cement mix

10. Test of well. Did you use test or permanent pump? test 8" Size of Bowl 9 Stages

11. Size of orifice 6 inch by 4 inch. Orifice tube reading 25 inches.

12. Pumping test — measurements from ground level:

TIME	G.P.M.	STATIC	DRAWDOWN	PUMPING LEVEL
8:00	317	14'	15'	29'
8:30	317	14'	15'	29'
9:00	317	14'	17'	31'
11:00	317	14'	17'	31'
2:00	317	14'	17'	31'
3:00	317	14'	17'	31'
4:30	492	14'	26'	40'

13. Recovery in 5 minutes ..... , in 30 minutes .....

14. Did you seal bottom of well? yes Thickness ..... inches, material stainless 7 ga. plate

15. Well underreamed? ..... From ..... feet to ..... feet, ... feet to ..... feet.

16. If all screen was not placed at bottom, state how it was spaced.

From ..... feet to ..... feet; from ..... feet to ..... feet; from ..... feet to ..... feet.

17. Depth of well from ground level to top of plug 76' 6" Size of drilled hole 42"

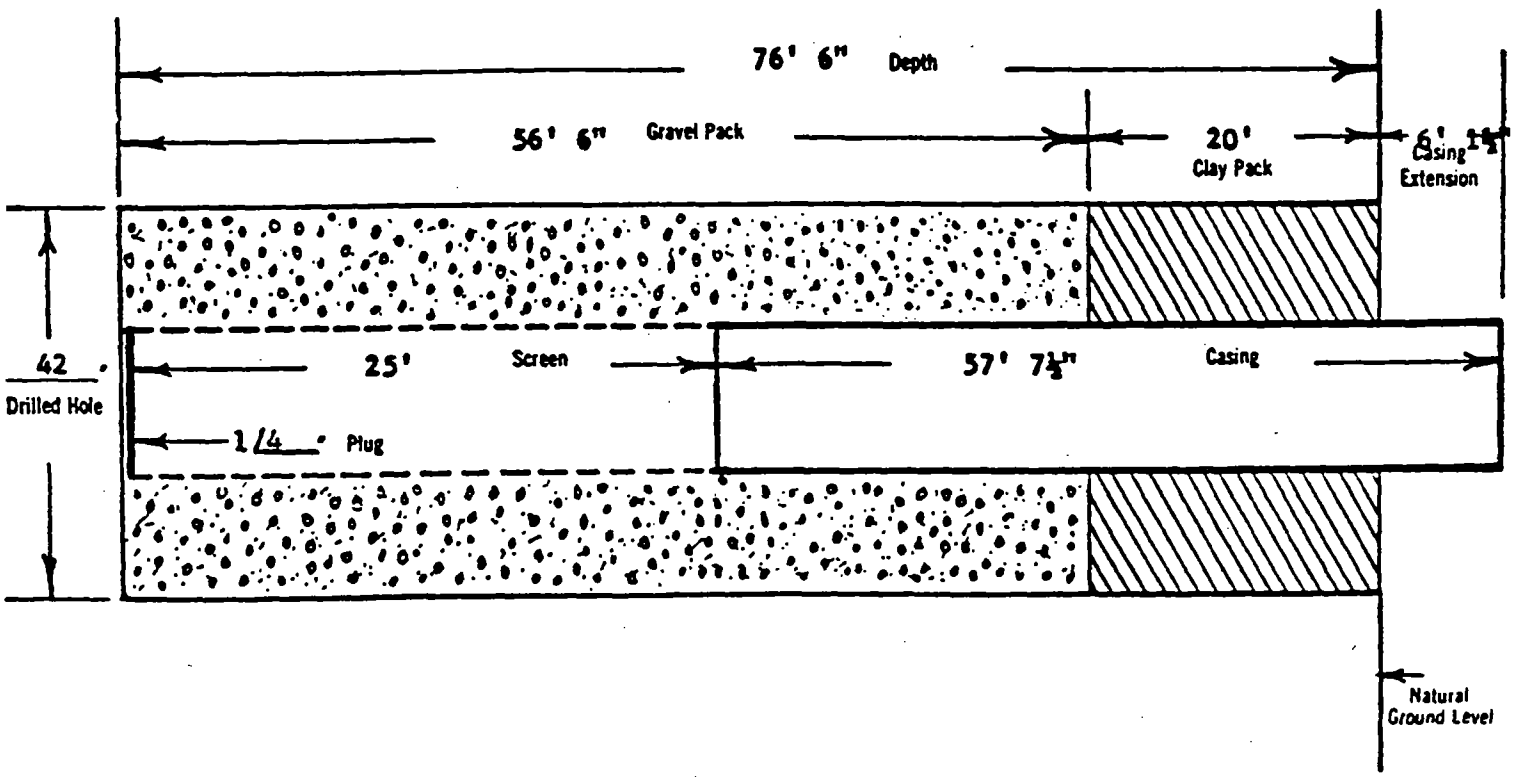
18. Was cement placed around or between any of the casings? No

19. If so, state where, how much and method used. .....

CONTRACT City of Atlantic, Iowa Well No. 10

Log of well from ground level:

Feet		Feet	Formation
	to		
0'	to	5'	Black soil
5'	to	13'	Brown clay
13'	to	21'	Coarse sand and fine sand - loose
21'	to	36'	Coarse sand, small gravel, and fine sand - loose
36'	to	41'	Dakota sandstone, medium size and fairly loose
41'	to	54' 6"	Dakota sandstone, medium, some gravel size and fairly loose
54' 6"	to	55' 6"	Shale
55' 6"	to	71'	Dakota sandstone, medium size and fairly loose
71'	to	76' 6"	Dakota sandstone, some gravel size
76' 6"	to		Yellow shale
	to		
	to		
	to		
	to		
	to		



Layne-Western Company, Inc. — Well Information

Omaha, Nebr.

1. Contract City of Atlantic Date 8-10-77

2. City and State Atlantic, Iowa Driller Bill Leuschen

3. Well No. 12 at test hole No. 66-4 Well location (attach map) 600' east of #11

4. Work completed 8-12-77 No of man hours as charged to job on time sheet

5. MATERIAL:

	LENGTH	DIA.	GAUGE OR WALL THICKNESS	MATERIAL	TYPE	NO. OF OPENINGS
6. Screen	30'	12"	7 gauge	s.s.	Layne shutter	5
7. Inner Casing	60'	12"	.375	steel	blank	
8. Outer Casing						

9. 40 tons of gravel used in the well. Size 36 River Run Rad Gravel Grade

10. Test of well. Did you use test or permanent pump? test 8" T (Size of Bowl) 3 (Stages)

11. Size of orifice 4 inch by 3 inch. Orifice tube reading inches.

12. Pumping test — measurements from ground level:

TIME	G.P.M.	STATIC	DRAWDOWN	PUMPING LEVEL
24 hours	300	14.0'	14.0'	28.0'

13. Recovery in 5 minutes full, in 30 minutes

14. Did you seal bottom of well? yes Thickness 3/16 inches, material stainless steel

15. Well underreamed? From feet to feet, feet to feet.

16. If all screen was not placed at bottom, state how it was spaced.

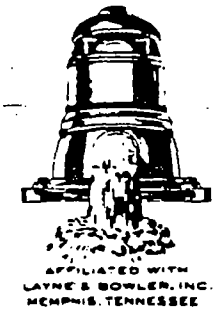
From feet to feet; from feet to feet; from feet to feet.

17. Depth of well from ground level to top of plug 83½ Size of drilled hole 42"

18. Was cement placed around or between any of the casings? No

19. If so, state where, how much and method used.

Record of Wells 8 and 9



Layne-Western Company

WATER WELL DRILLING
EXPLORATION BORINGS AND TEST SURVEYS
LAYNE TURBINE PUMPS

OFFICES
KANSAS CITY, MISSOURI
WICHITA, KANSAS
OMAHA, NEBRASKA
AMES, IOWA
AURORA, ILLINOIS
ST. LOUIS, MISSOURI
DENVER COLORADO

4430 COMMERCIAL AVENUE
OMAHA 10
NEBRASKA

PHONE 451-2368

October 4, 1961
(dict. 10-3-61)

Mr. Adolph Paul
Water Commissioner
Atlantic, Iowa

Dear Adolph:

Enclosed please find one copy of each well information sheet on well No. 8 and 9 which we drilled for the City of Atlantic in August, 1955. I believe you mentioned to me yesterday that your city numbers were exactly the opposite so that you might want to renumber these sheets.

Also, I believe you asked the question about the size of the screen in the bottom of the wells. You will note that the casing size is 16" O.D., and according to our information is 1/2" wall casing which would have an I.D. then of 15". The screen is a Layne bronze shutter screen, and the maximum O.D. of the screen over the welded bronze bands at each screen joint would be approximately 13½ to 14" O.D.; and I am sure you would find a clear opening through the strainer as approximately 12 1/4". There is a total of 30 ft. of screen in the bottom of each well, and each well has a 5 ft. length of bronze blank casing on the top of the screen with a lead seal swedged out against the 16" O.D. casing.

If you were to use your surge block plunger on either of the wells and wanted to actually surge in the well screen I am sure that you would find that a 11 1/2" or 11 3/4" diameter ring would fit nicely inside the screen, and if you wanted a tighter fit you probably could even go to a 12" diameter rubber ring.

I trust this gives you the information you might have desired. Should you have any further questions, please advise me.

Yours truly,

LAYNE WESTERN COMPANY

C. C. Haas

C. C. Haas

CCH/cc

Att.

Layne-Western Company Omaha, Nebraska

Well Information

1. Contract City of Atlantic Date August 7, 1955

City and State Atlantic, Iowa Driller Bruce Canarsky

3. Well No. 8 Well location: 400' North west of Power Plant across creek

4. Work began July 27, 1955 work completed August 2, 1955 Number of working days 6

5. Diameter, length and type of material left in well:

6. 30' feet of shutter insert type screen made of bronze No. 3 openings. 5' of bronze blank with lead seal

7. 52 feet of 16 inch inside casing made of std pipe ¼" wall with welded connections.

8. ____ feet of ____ inch outside casing made of ____ with ____ connections.

9. 24 yards of gravel used in the well. Size road gravel

10. Test of well. Did you use test or permanent pump? Test 6" (Size of Bowl) 5 (Stages)

11. Size of orifice 4 inch by 3 inch. Orifice tube reading 23 inches.

12. Pumping test — measurements from ground level:

taken every 30 minutes

TIME	G.P.M.	STATIC	DRAWDOWN	PUMPING LEVEL
8:30 am	200	20	15	35
8:30 pm	200	20	15	35
12:00 am	200	20	15	35
6:00 am	250	20	18' 6"	38' 6"
7:00 am	300	20	22	42
8:00 am	200	20	15	35
10:00 am	200	20	15	35

13. Recovery in 5 minutes ____, in 30 minutes ____

14. Did you seal bottom of well? yes Thickness 3/8 inches, material bronze plate

15. Well underreamed? no From ____ feet to ____ feet, ____ feet to ____ feet.

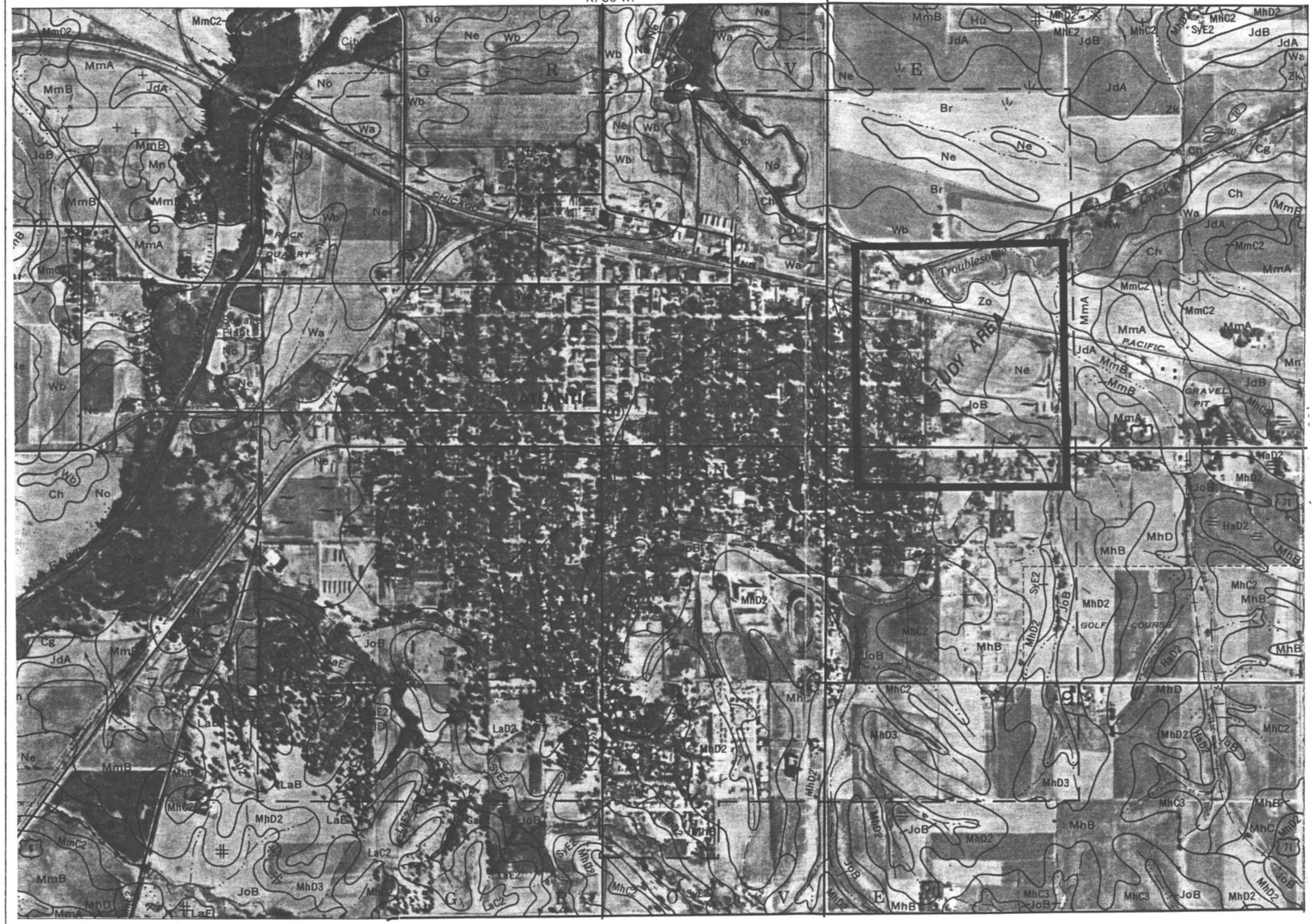
16. If all screen was not placed at bottom, state how it was spaced.

From ____ feet to ____ feet; from ____ feet to ____ feet; from ____ feet to ____ feet.

17. Depth of well from ground level to top of plug 79' 6" Size of drilled hole 12"

18. Was cement placed around or between any of the casings? from 23' to 30'

19. If so, state where, how much and method used. Put through 2" pipe



EXPLANATION

Marshall-Bremer-Nevin
Nodaway-Zook-Colo

- Br - Bremer silty clay loam
- Cg - Colo silty clay loam
- JdA - Judson silt loam 0-2% slopes
- MhDz - Marshall silty clay loam 9-14% slopes, moderately eroded
- MmA - Marshall silty clay loam, benches, 0-2% slopes
- Ne - Nevin silty clay loam
- Nw - Nodaway silt loam, channeled
- Zk - Zook silt loam, overwash
- Zo - Zook silty clay loam
- Wb - Wabash silty clay loam

ATLANTIC
PUBLIC WATER SUPPLY
ATLANTIC, IOWA

Scale 1:15840

0 ½ Mile

0 3 000 Feet

WASTE SITE TRACKING NO.: IA0194

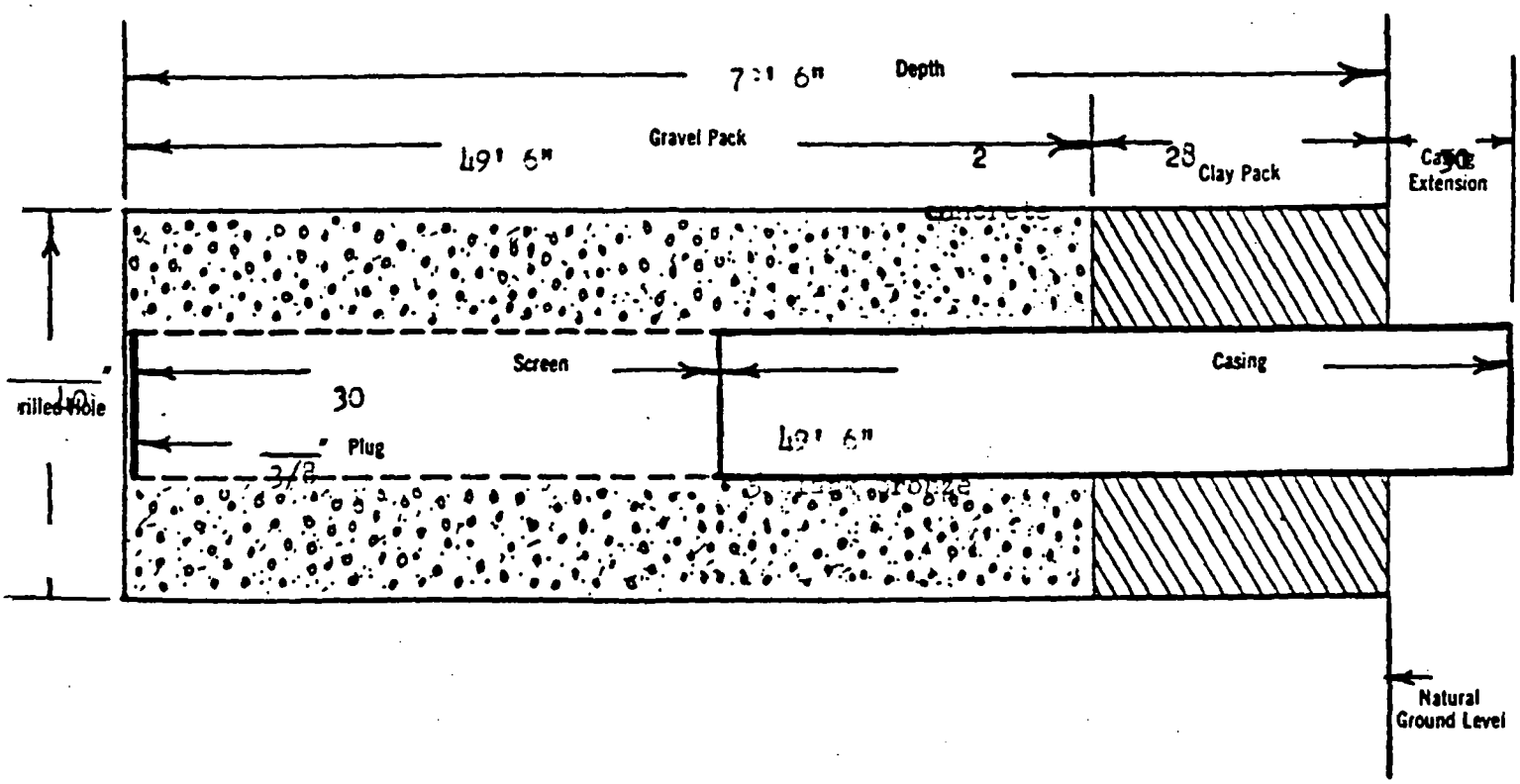
ECOLOGY & ENVIRONMENT FIT JAN. 1988
SOURCE: REF. 8

FIGURE 5: SOILS MAP

CONTRACT City of Atlantic, Iowa Well No. 8

Log of well from ground level:

Feet		Feet	Formation
0	to	11	Brown silty clay
11	to	13	Blue clay
13	to	17	Coarse sand trace of clay
17	to	20	Blue clay
20	to	22	Coarse sand trace of boulders & lens
22	to	27	Blue clay
27	to	30	Coarse sand and gravel - boulders
30	to	36	Dakota sandstone with clay streaks
36	to	41	Dakota sandstone fairly tight
41	to	77' 6"	Dakota sandstone fairly loose
77' 6"	to	79' 6"	Limestone and Dakota sandstone
	to		
	to		
	to		
	to		
	to		



Wayne-Western Company

1430 Commercial Ave. Omaha, Nebraska

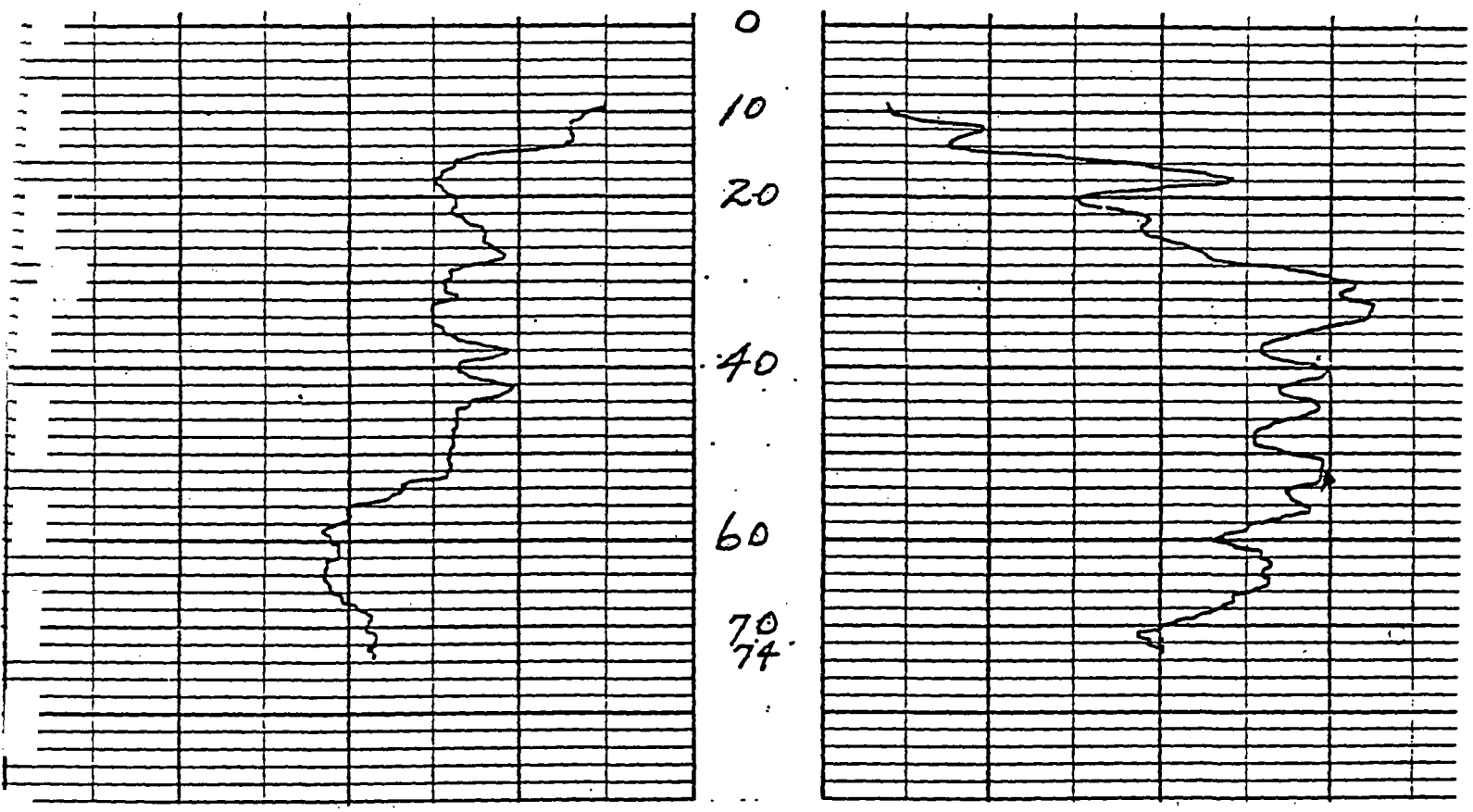
ELECTRICAL LOG

STOMER City of Atlantic				ADDRESS Atlantic Iowa			
WELL NO. Test 66-1		ZERO ELEVATION GL		COUNTY Cass		STATE Iowa	
CATION							
te	1-18-66	Resistivity Scale: 1"	25 Ω	Nature of Mud	bentonite	pH	
irst Reading	74'	Potential Scale: 1"	10 mV.	Density		Circ. Temp.	
ast Reading	10'	Lineal Scale: 1"	20'	Viscosity		Weather	
otage Logged	64'	Casing (Driller)	None	Bottom (Driller)		Logged by	D. Oseka
Size:	6"	Casing Size	—	Casing (From Log)		Witnessed by	

REMARKS

SPONTANEOUS-POTENTIAL (MILLIVOLTS)

RESISTIVITY (OHMS)



Layne-Western Company Omaha, Nebraska

1. Contract City of Atlantic Date August 7, 195[illegible]

City and State Atlantic, Iowa Driller Bruce Caransky

3. Well No. 9 Well location: 30[illegible]' North of Power Plant across creek.

4. Work began July 17, 195[illegible]; work completed July 27, 195[illegible] Number of working days 7

5. Diameter, length and type of material left in well:

6. 30 feet of shutter screen made of 5' bronze blank with lead seal bronze No. 3 openings.

7. 57'6" feet of 16 inch inside casing made of std. pipe ~~12"~~ 1/2" with welded connections.

8. ____ feet of ____ inch outside casing made of ____ with ____ connections.

9. 20 yards of gravel used in the well. Size road gravel

10. Test of well. Did you use test or permanent pump? test Size of Bowl 6 Stages 5

11. Size of orifice 4 inch by 2 1/2 inch. Orifice tube reading 23 inches.

12. Pumping test — measurements from ground level:

TIME	G.P.M.	STATIC	DRAWDOWN	PUMPING LEVEL
~~3:30 pm~~	~~200~~	~~19~~	~~9~~	~~28~~
~~3:30 am~~	~~200~~	~~17~~	~~9~~	~~26~~
~~8:30 am~~	~~200~~	~~17~~	~~9~~	~~28~~
~~9:00 am~~	~~250~~	~~19~~	~~11~~	~~30~~
~~12:00 pm~~	~~250~~	~~19~~	~~11~~	~~30~~
~~2:00 pm~~	~~300~~	~~19~~	~~13~~	~~32~~
~~3:30 pm~~	~~300~~	~~19~~	~~13~~	~~32~~

13. Recovery in 5 minutes ____, in 30 minutes ____

14. Did you seal bottom of well? yes Thickness 3/8 inches, material bronze

15. Well underreamed? no From ____ feet to ____ feet, ____ feet to ____ feet.

16. If all screen was not placed at bottom, state how it was spaced.

From ____ feet to ____ feet; from ____ feet to ____ feet; from ____ feet to ____ feet.

17. Depth of well from ground level to top of plug 85' Size of drilled hole 40"

18. Was cement placed around or between any of the casings? 20' to 30'

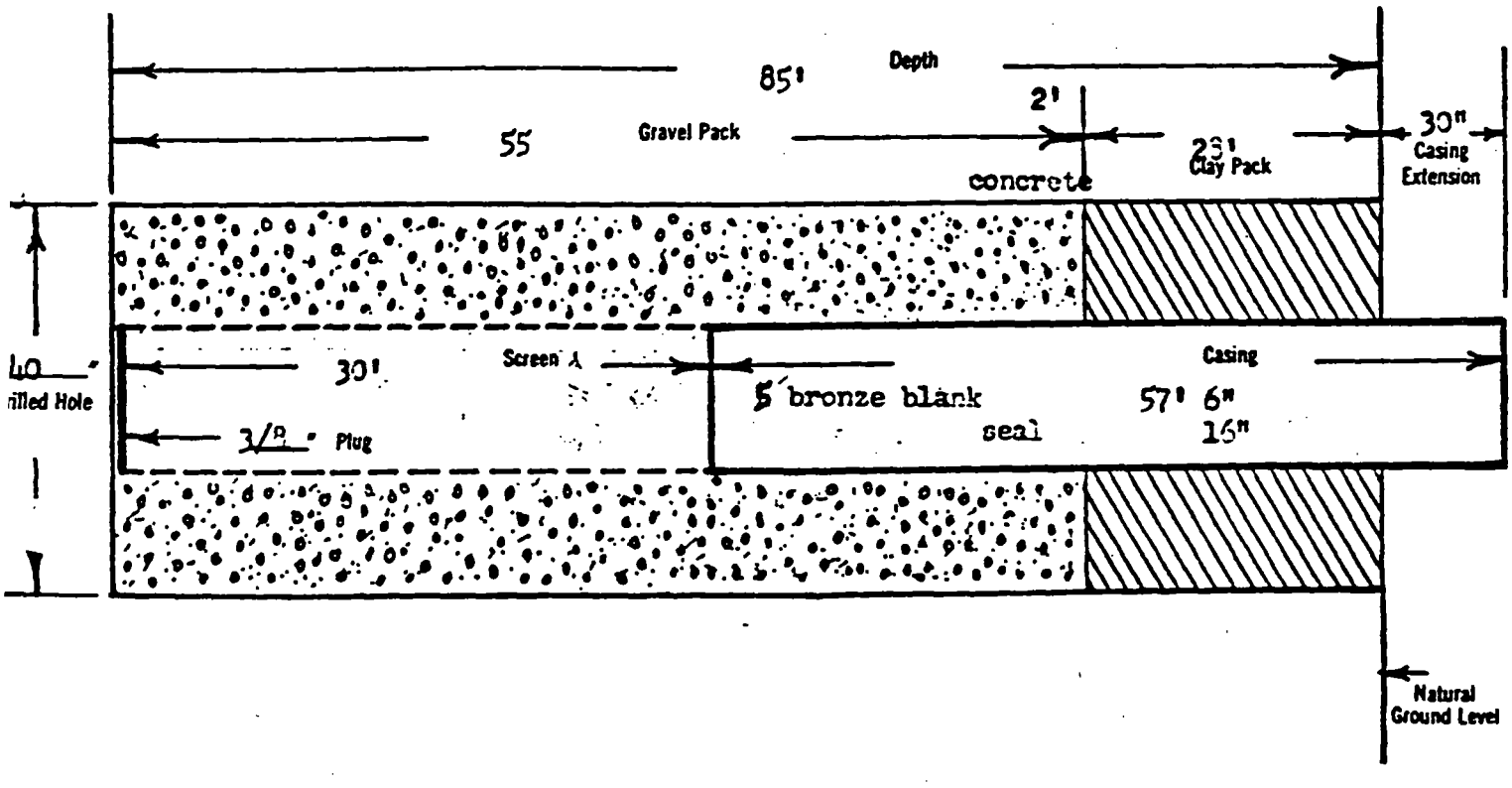
19. If so, state where, how much and method used. through 2" pipe

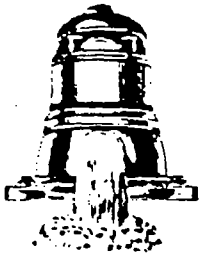
Layne-Western Co., Inc. Omaha, Nebraska **Well Information** Page 1

CONTRACT City of Atlantic, Iowa Well No. 9

g of well from ground level:

Feet		Feet	Formation
0	to	11	Brown clay
11	to	17	Blue clay
17	to	26	Coarse sand and gravel - boulder
26	to	31	Dakota sandstone
31	to	36	Dakota sandstone with clay streaks
36	to	65	Dakota sandstone fairly loose
65	to	85	Dakota sandstone loose and coarse
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		
	to		





Layne-Western Company

WATER WELL DRILLING
EXPLORATION BORINGS AND TEST SURVEYS
LAYNE TURBINE PUMPS

PHONE 451-2388

May 13, 1966
(dict. 5-12-66)

OFFICES
KANSAS CITY, MISSOURI
WICHITA, KANSAS
OMAHA, NEBRASKA
AMES, IOWA
AURORA, ILLINOIS
ST. LOUIS, MISSOURI
DENVER, COLORADO

4430 COMMERCIAL AVENUE
OMAHA
NEBRASKA
68110

Mr. Lowell G. Edwards
Manager
Atlantic Municipal Utilities
Atlantic, Iowa

Dear Mr. Edwards:

We are pleased to attach two copies of well record sheet on your new well No. 10 installed at test hole 66-2.

Yours truly,

LAYNE-WESTERN COMPANY

G. H. Beard

G. H. Beard

GHB:ks

Encl. 2

APPENDIX E

SOIL GAS DATA

THE FOLLOWING INFORMATION IS SCREENING DATA. IT IS PRELIMINARY DATA GENERATED WITH CERTAIN METHOD MODIFICATIONS THAT REDUCE THE LEVEL OF CONFIDENCE ASSOCIATED WITH THE RESULTS. THE INFORMATION MAY BE USEFUL IN DETERMINING PLUME MIGRATION PATTERNS, AND RELATIVE SOIL CONTAMINANT CONCENTRATIONS, BUT NOT ABSOLUTE CONCENTRATIONS.

THE ANALYSES WERE PERFORMED USING AN ANALYTICAL INSTRUMENTS DEVELOPMENT (AID) MODEL 511 GAS CHROMATOGRAPH. THE SEPARATIONS WERE PERFORMED AT 60°C AND 30 CC/MINUTE CARRIER GAS FLOW EXCEPT WHERE NOTED. THE GC WAS EQUIPPED WITH A 1/8"x 10' STAINLESS STEEL COLUMN HAVING A 3% DC-200 LIQUID PHASE.

AUGUST 24, 1987

	TIME	RESPONSE	NG	ATTEN	UL INJ	NET	
STANDARD		17	1	8			
STANDARD		32	2	8			
STANDARD		49	3	8			
B. BLANK *1		7	.77	8	1000	.00	
STANDARD		21	5	8			
STANDARD		21	5	8			
STANDARD		19	5	8			
SAMPLE							
04	1205	32	1.18	8	1000	.39	
04		32	1.18	8	1000	.39	
B. BLANK		7	.77	8	1000	.00	
03	1430	10	.82	8	1000	.03	
B. BLANK		2	.69	8	1000	---	
01	1437	21	12	8	100	11.2	
01	1450	34	6.1	8	200	5.3	
B. BLANK		--	0	8	1000	---	
02	1613	72	36.4	16	100	35.6	*2
02	1628	57	31.6	16	100	30.8	*2
02	1654	52	30.0	16	100	29.2	*2
B. BLANK	1730	0	0.0	16	1000	0.0	
12	1745	0	0.0	16	500	0.0	
12	1750	0	0.0	16	1000	0.0	
11	1817	2	0.69	16	1000	0.0	

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August 25, 1987

	TIME	RESPONSE	NG INJ	ATTEN
STANDARD	0835	27	2.5	16
STANDARD	0930	92	10	16
STANDARD	0945	86	10	16
STANDARD	0955	31	2.5	16
STANDARD	1000	67	5	16
STANDARD	1015	59	5	16
STANDARD	1030	5	0	16

SAMPLE	TIME	RESPONSE	NG INJ	ATTEN	UL INJ	NET
4A	1045	13	1	16	1000	0.7
13	1103	5	.03	16	1000	0.0
13	1114	4	.0	16	1000	0.0
14	1216	2	.0	16	1000	0.0
14	1224	3	.0	16	1000	0.0
15	1237	2	.0	16	1000	0.0
16	1305	2	.0	16	1000	0.0
6	1520	15	1.11	16	1000	0.8
6	1532	15	1.11	16	1000	0.8
5	1549	OS	----	16	1000	---
5	1549	OS	----	16	500	---
5	1612	81	65 +	16	100	65+
5	1616	83	65 +	16	100	67+
5		147	119+	16	100	119+
5		145	119+	16	100	119+
5		132	119+	16	100	119+
20	1657	72	5.8	16	1000	5.5
20	1712	80	6.5	16	1000	6.2
7	1731	9	.5	16	1000	0.3
7	1736	9	.5	16	1000	0.3
19	1754	3	.0	16	1000	0.0
19	1758	3	.0	16	1000	0.0
17	1808	19	1.5	16	1000	1.2
17	1815	19	1.5	16	1000	1.2

THE FOLLOWING INFORMATION IS SCREENING DATA. IT IS PRELIMINARY DATA GENERATED WITH CERTAIN METHOD MODIFICATIONS THAT REDUCE THE LEVEL OF CONFIDENCE ASSOCIATED WITH THE RESULTS. THE INFORMATION MAY BE USEFUL IN DETERMINING PLUME MIGRATION PATTERNS, AND RELATIVE SOIL CONTAMINANT CONCENTRATIONS, BUT NOT ABSOLUTE CONCENTRATIONS.

AUGUST 26, 1987

TIME	RESPONSE	NG INJ	ATTEN
0910	67	5	16
0924	69	5	16
0930	4	0	16
	5	0	16

SAMPLE	TIME	RESPONSE	NG INJ	ATTEN	UL INJ	NET
21	0938	60	4.4	16	1000	4.5
21	0942	69	5.1	16	1000	5.3
21	0946	70	5.2	16	1000	5.3
23	0950	6	.1	16	1000	0.1
23	0954	7	.2	16	1000	0.2
32	0959	28	1.9	16	1000	1.9
32	1004	30	2.0	16	1000	2.0
20	0959	28	1.9	16	1000	1.9
20	1004	30	2.1	16	1000	2.1
30	1017	11	0.5	16	1000	0.5
30	1021	11	0.5	16	1000	0.5
69	1254	11	0.5	16	1000	0.5
69		10	0.4	16	1000	0.4
68	1319	10	0.4	16	1000	0.4
68	1324	10	0.4	16	1000	0.4
67	1340	3	0.0	16	1000	0.0
67	1346	3	0.0	16	1000	0.0
28	1414	21	1.3	16	1000	1.3
28	1417	21	1.3	16	1000	1.3
26	1452	6	0.1	16	1000	0.1
26	1508	5	0.0	16	1000	0.0
36	1513	2	0.0	16	1000	0.0
36	1517	3	0.0	16	1000	0.0
37	1551	0	0.0	16	1000	0.0
37	1556	2	0.0	16	1000	0.0
38	1608	0	0.0	16	1000	0.0
38	1610	0	0.0	16	1000	0.0
41	1637	38	2.6	16	1000	2.7
41	1641	40	2.8	16	1000	2.8
43	1655	3	0.0	16	1000	0.0
43	1659	3	0.0	16	1000	0.0
44	1717	32	2.2	16	1000	2.2
44	1721	31	2.1	16	1000	2.1
46	1735	20	1.2	16	1000	1.2
46	1740	18	1.1	16	1000	1.1
35	1753	0	0.0	16	1000	0.0
35	1818	0	0.0	16	1000	0.0
70	1830	57	4.1	16	1000	4.3
70	1837	54	3.9	16	1000	3.9

THE FOLLOWING INFORMATION IS SCREENING DATA. IT IS PRELIMINARY DATA GENERATED WITH CERTAIN METHOD MODIFICATIONS THAT REDUCE THE LEVEL OF CONFIDENCE ASSOCIATED WITH THE RESULTS. THE INFORMATION MAY BE USEFUL IN DETERMINING PLUME MIGRATION PATTERNS, AND RELATIVE SOIL CONTAMINANT CONCENTRATIONS, BUT NOT ABSOLUTE CONCENTRATIONS.

AUGUST 27, 1987

SAMPLE	TIME	RESPONSE	NG INJ	ATTEN	UL INJ	NET
STD CHECK	1201	47	2.5	16		3.3
	1205	38	2.5	16		2.6
	1209	36	2.5	16		2.5
		2	0.0	16		0.0
		6	0.0	16		0.1

SAMPLE	TIME	RESPONSE	NG INJ	ATTEN	UL INJ	NET
25	0923	5	0.0	16	1000	0.0
25		7	0.2	16	1000	0.1
63	0949	42	3.0	16	1000	2.9
63		53	3.8	16	1000	3.8
		48	3.4	16	1000	3.4
62	1316	39	2.7	16	1000	2.7
62	1320	37	2.6	16	1000	2.5
64	1324	20	1.2	16	1000	1.1
64	1328	22	1.4	16	1000	1.3
65	1341	31	2.1	16	1000	2.0
65	1345	42	3.0	16	1000	2.9
65	1350	30	2.0	16	1000	2.0
60	1401	0	0.0	16	1000	0.0
60	1404	0	0.0	16	1000	0.0
59	1444	20	1.2	16	1000	1.1
59	1449	21	1.3	16	1000	1.2
58	1517	35	2.4	16	1000	2.4
58	1520	27	1.8	16	1000	1.7
58		28	1.9	16	1000	1.8
58		39	2.7	16	1000	2.7
56	1528	0	0.0	16	1000	0.0
56		0	0.0	16	1000	0.0
54	1552	6	0.1	16	1000	0.0
54	1557	4	0.0	16	1000	0.0
49	1607	0	0.0	16	1000	0.0
49	1621	0	0.0	16	1000	0.0
53	1718	12	0.6	16	1000	0.5
53	1722	10	0.4	16	1000	0.3
53	1726	13	0.7	16	1000	0.6
61	1756	15	0.8	16	1000	0.7
61	1800	16	0.9	16	1000	0.8
72	1820	0	0.0	16	1000	0.0
72	1824	0	0.0	16	1000	0.0
73	1833	9	0.4	16	1000	0.2
73	1837	11	0.5	16	1000	0.4

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AUGUST 27, 1987 (CONTINUED)

SAMPLE	TIME	RESPONSE	NG INJ	ATTEN	UL INJ	NET
51	1630	0	0.0	16	1000	0.0
51	1633	0	0.0	16	1000	0.0
74	1846	1	0.0	16	1000	0.0
74	1848	0	0.0	16	1000	0.0

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AUGUST 28, 1988 (INJECT PORT TEMP PROBLEMS, COMPENSATE WITH OVEN TEMP).

TIME	RESPONSE	NG INJ	ATTEN
1001	77	2.5	2
1006	77	2.5	2
1009	85	2.5	2
1030	134	5.0	2
1036	152	5.0	2
1041	146	5.0	2
1047	64	1.5	2
	66	1.5	2

SAMPLE	TIME	RESPONSE	NG INJ	ATTEN	UL INJ	NET
79	1019	23	0.0	2	1000	0.0
79	1025	20	0.0	2	1000	0.0
78	1111	118	3.9	2	1000	3.5
78	1116	120	4.0	2	1000	3.6
77	1559	70	160	16	100	64 +
77	1607	77	220	16	100	76.4+
80	1454	52	2.4	4	1000	0.46
80	1451	46	1.9	4	1000	0.1
80	1447	50	1.1	4	1000	---
B. BLANK	1542	8	0.0	16	1000	---
B. BLANK	1546	8	0.0	16	1000	---

*1 B. BLANK IS THE BULB BLANK
*2 HEAVY ENDS OF CREOSOTE ? PRESENT SAMPLE WAS TAKEN NEAR A TELEPHONE POLE.
O.S. MEANS OFF SCALE RESPONSE

APPENDIX F

DATA TRANSMITTAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

DEC 17 1987

DATE: 12/14/87

MEMORANDUM

SUBJECT: Data Transmittal For Activity Number: IK994
Site Description: Atlantic P.W.S.

FROM: Robert D. Kleopfer, Ph.D. RDK
Chief, Laboratory Branch, ENSV

TO: Charles P. Hensley
Chief, Emergency Planning and Response Branch, ENSV

ATTN: _____

Attached is the data transmittal for the above referenced site. This should be considered a ___ Partial ___ Corrected X Complete data transmittal (completes transmittal of _____). If you have any questions or comments, please contact D. Simmons at 236-3881.

Attachments

cc: Data File
E+E
SPFD
WATR
R. Rau, EPAR

DEC 21 1987

E&E K.C.K.

EPA Region VII

Data Qualification Codes

U - Compound was not detected.

M - Compound was qualitatively identified; however, quantitative value is less than contract required detection limits (CLP data); or value is less than limit of quantitation (EPA data).

J - Compound was qualitatively identified; however, compound failed to meet all QA criteria and, therefore, is only an estimated value.

I - Analysis attempted, but no results can be reported.

O - Sample lost or not analyzed.

L - Value known to be higher than value reported.

NA I - Sample was not analyzed for this compound.

Codes for Flash Point Data

L - The sample did not ignite or "flash." This is the highest temperature at which the sample was tested. It is possible that the material may be ignitable at higher temperatures.

K - The sample did ignite or "flash" at the lowest temperature tested. This is usually the ambient temperature at the time of the test. It is possible that the material may be ignitable at even lower temperatures.

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: ATLANTIC PUBLIC WATER SUPPLY Site Number:
Location: ATLANTIC IA Site Code:

Collected: YR: (87) MO: 8 Day: 24 Time: 1545 / 1600 Leader: PHIL DULA

Sample Number: IK9940#1 SMO #:

Sample Media (circle one):
(SOIL) DUST, RINSATE, SEDIMENT, WATER, OTHER:_____

Sample Split (circle one): YES (NO)

Sample Container	Tag Color	Preservative	Analysis Requested
8 OZ JAR	PURPLE	NONE	PESTICIDES
8 OZ JAR	PURPLE	NONE	BNA
2 40 ML VIAL	LIME	NONE	VOA

Depth: 4 TO 5 FT Pan #: FIA0194SBF Aliquots: ONE

Samplers: PHILIP DULA, KEVIN HUGILL

COMMENTS OF FIELD PERSONNEL

Site Description: ATLANTIC. P.W.S. ATLANTIC. IOWA PROBE LOCATION #1 - SAMPLE CONSISTS OF SOIL WITH HIGH CLAY CONTENT. DARK BROWN TO GRAY BLACK SOIL. SOIL IS VERY PLASTIC IN CONSISTENCY. THIS MAY BE DUE TO RAINY WEATHER ON 8-24-87. AND HIGH CLAY CONTENT OF SOIL.

POSSIBLE MEDIUM CONCENTRATION

IBM-PC

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: ATLANTIC PUBLIC WATER SUPPLY Site Number:
Location: ATLANTIC IA Site Code:

Collected: YR: (87) MO: 8 Day: 27 Time: 1030 Leader: PHIL DULA

Sample Number: IK99400Q2. SMO #:

Sample Media (circle one):
(SOIL) DUST, RINSATE, SEDIMENT, WATER, OTHER:_____

Sample Solit (circle one): YES NO

Sample Container	Tag Color	Preservative	Analysis Requested
8 OZ JAR	PURPLE	NONE	PESTICIDES
8 OZ JAR	PURPLE	NONE	BNA
2 40 ML VIAL	LIME	NONE	VOA

Depth: 2-3 FT Pan #: FIA@1945B Aliquots: 2

Samplers: PHILIP DULA, JEAN CARLETON

COMMENTS OF FIELD PERSONNEL

Site Description: ATLANTIC P.W.S ATLANTIC, IOWA

SAMPLE LOCATION - PROBE LOCATION #5
30 FT EAST PROBE LOCATION #5. (HARDEE'S REST.)

POSSIBLE MEDIUM CONCENTRATION.

IBM-PC

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: ATLANTIC PUBLIC WATER SUPPLY Site Number:
Location: ATLANTIC IA Site Code:

Collected: YR: (87) MO: 8 Day: 28 Time: 1000 Leader: PHIL DULA

Sample Number: IL994003 SMO #:

Sample Media (circle one):
(SOIL) DUST, RINSATE, SEDIMENT, WATER, OTHER:_____

Sample Solit (circle one): YES (NO)

Sample Container	Tag Color	Preservative	Analysis Requested
8 OZ JAR	PURPLE	NONE	PESTICIDES
8 OZ JAR	PURPLE	NONE	BNA
2 40 ML VIAL	LIME	NONE	VOA

Depth: 0-4' Pan #: FIA01145B Aliquots: 5

Samplers: PHILIP DULA

COMMENTS OF FIELD PERSONNEL

Site Description: PROBE LOCATION #77 - ≈ 150 FEET EAST OF PROBE LOCATION #5. (HARDEE'S REST.)

POSSIBLE MEDIUM. CONCENTRATION.

IBM-PC

ANALYSIS TYPE: VOLATILES

TITLE: ALANTA PWSTLANTA PWS MATRIX: SEDIMENT UNITS: UG/KG
LAB: IT CERRITOS METHOD: 9302M01 CASE: 7980
SAMPLE PREP:_____ ANALYST/ENTRY: LOS REVIEWER: JSL DATE: 11/24/87

	IK994001	IK994002	IK994003
CHLOROMETHANE	13.U	12.U	12.U
BROMOMETHANE	13.U	12.U	12.U
VINYL CHLORIDE	13.U	12.U	12.U
CHLOROETHANE	13.U	12.U	12.U
METHYLENE CHLORIDE	32.U	21.U	27.U
ACETONE	26.U	20.U	26.U
CARBON DISULFIDE	6.6U	6.0U	6.2U
1,1 DICHLOROETHENE	6.6U	6.0U	6.2U
1,1 DICHLOROETHANE	6.6U	6.0U	6.2U
TRANS-1,2,-DICHLOROETHENE	6.6U	6.0U	6.2U
CHLOROFORM	6.6U	6.0U	6.2U
1,2,DICHLOROETHANE	6.6U	6.0U	6.2U
2-BUTANONE	I	I	I
1,1,1 TRICHLOROETHANE	4.0M	6.0M	6.2U
CARBON TETRACHLORIDE	6.6U	6.0U	6.2U
VINYL ACETATE	13.U	12.U	12.U
BROMODICHLOROMETHANE	6.6U	6.0U	6.2U
1,1,2,2,-TETRACHLOROETHANE	6.6U	6.0U	6.2U
1,2-DICHLOROPROPANE	6.6U	6.0U	6.2U
TRANS-1,3-DICHLOROPROPENE	6.6U	6.0U	6.2U
TRICHLOROETHENE	6.6U	6.0U	6.2U
DIBROMOCHLOROMETHANE	6.6U	6.0U	6.2U
1,1,2-TRICHLOROETHANE	6.6U	6.0U	6.2U
BENZENE	6.6U	6.0U	6.2U
CIS-1,3-DICHLOROPROPENE	6.6U	6.0U	6.2U
2-CHLOROETHYL VINYL ETHER	13.U	12.U	12.U
BROMOFORM	6.6U	6.0U	6.2U
2-HEXANONE	13.U	12.U	12.U
4-METHYL-2-PENTANONE	13.U	12.U	12.U
TETRACHLOROETHENE	2.0M	20.	29.
TOLUENE	6.6U	6.0U	6.2U
CHLOROBENZENE	6.6U	6.0U	6.2U
ETHYL BENZENE	6.6U	6.0U	6.2U
STYRENE	6.6U	6.0U	6.2U
TOTAL XYLENES	6.6U	6.0U	6.2U

** NOTE: N/A MEANS NOT ANALYZED **
*** I MEANS ANALYZED BUT INVALID DATA ***

ANALYSIS TYPE: SEMIVOLATILES-PAGE 1

TITLE: ATLANTA PWS | MATRIX: SEDIMENT | UNITS: UG/KG
LAB: IT CERRITOS | METHOD: 9302M01 | CASE: 7980
SAMPLE PREP:_____ ANALYST/ENTRY: LO6 REVIEWER: _____ VS VL DATE: 11/24/87

	IK994001	IK994002	IK994003
PHENOL	430.U	400.U	410.U
BIS(2-CHLOROETHYL) ETHER	430.U	400.U	410.U
2-CHLOROPHENOL	430.U	400.U	410.U
1,3 DICHLOROBENZENE	430.U	400.U	410.U
1,4 DICHLOROBENZENE	430.U	400.U	410.U
BENZYL ALCOHOL	430.U	400.U	410.U
1,2 DICHLOROBENZENE	430.U	400.U	410.U
2-METHYLPHENOL	430.U	400.U	410.U
BIS(2-CHLOROISOPROPYL)ETHER	430.U	400.U	410.U
4-METHYLPHENOL	430.U	400.U	410.U
N-NITROSO-DIPROPYLAMINE	430.U	400.U	410.U
HEXACHLOROETHANE	430.U	400.U	410.U
NITROBENZENE	430.U	400.U	410.U
ISOPHORONE	430.U	400.U	410.U
2-NITROPHENOL	430.U	400.U	410.U
2,4-DIMETHYLPHENOL	430.U	400.U	410.U
BENZOIC ACID	2100.U	1900.U	2000.U
BIS(2-CHLOROETHOXY) METHANE	430.U	400.U	410.U
2,4 DICHLOROPHENOL	430.U	400.U	410.U
1,2,4-TRICHLOROBENZENE	430.U	400.U	410.U
NAPHTHALENE	430.U	400.U	410.U
4-CHLOROANILINE	430.U	400.U	410.U
HEXACHLOROBUTADIENE	430.U	400.U	410.U
4-CHLORO-3-METHYLPHENOL	430.U	400.U	410.U
2-METHYLNAPHTHALENE	430.U	400.U	410.U
HEXACHLOROCYCLOPENTADIENE	430.U	400.U	410.U
2,4,6-TRICHLOROPHENOL	430.U	400.U	410.U
2,4,5-TRICHLOROPHENOL	2100.U	1900.U	2000.U
2-CHLORONAPHTHALENE	430.U	400.U	410.U
2-NITROANILINE	2100.U	1900.U	2000.U
DIMETHYLPHTHALATE	430.U	400.U	410.U
ACENAPHTHYLENE	430.U	400.U	410.U
3-NITROANILINE	I	I	I
ACENAPHTHENE	430.U	400.U	410.U
2,4-DINITROPHENOL	2100.U	1900.U	2000.U
4-NITROPHENOL	2100.U	1900.U	2000.U
DIBENZOFURAN	430.U	400.U	410.U
2,4-DINITROTOLUENE	430.U	400.U	410.U

** NOTE: N/A MEANS NOT ANALYZED **
*** I MEANS ANALYZED BUT INVALID DATA ***

ANALYSIS TYPE: SEMIVOLATILES--PAGE 2

TITLE: ATLANTA PWS MATRIX: SEDIMENT UNITS: UG/KG
LAB: IT CERRITOS METHOD: 9302M01 CASE: 7980
SAMPLE PREP:_____ ANALYST/ENTRY: L07 REVIEWER: _____ DATE: 11/24/87

	IK994001	IK994002	IK994003
2,6-DINITROTOLUENE	430.U	400.U	410.U
DIETHYLPHTHALATE	430.U	400.U	88.M
4-CHLOROPHENYL PHENYL ETHER	430.U	400.U	410.U
FLUORENE	430.U	400.U	410.U
4-NITROANILINE	2100.U	1900.U	2000.U
4,6-DINITRO-2-METHYLPHENOL	2100.U	1900.U	2000.U
N-NITROSODIPHENYLAMINE	430.U	400.U	410.U
4-BROMOPHENYL PHENYL ETHER	430.U	400.U	410.U
HEXACHLOROBENZENE	430.U	400.U	410.U
PENTACHLOROPHENOL	2100.U	1900.U	2000.U
PHENANTHRENE	430.U	420.	160.M
ANTHRACENE	430.U	99.M	410.U
DI-N-BUTYLPHTHALATE	110.M	400.U	410.U
FLUORANTHENE	430.U	950.U	380.M
PYRENE	430.U	880.U	340.M
BUTYL BENZYL PHTHALATE	430.U	400.U	410.U
3,3' DICHLOROBENZIDINE	860.U	790.U	820.U
BENZO(A)ANTHRACENE	430.U	400.U	220.M
BIS(2-ETHYLHEXYL)PHTHALATE	430.U	400.U	410.U
CHRYSENE	430.U	400.U	220.M
DI-N-OCTYL PHTHALATE	430.U	400.U	410.U
BENZO(B)FLUORANTHENE	430.U	400.U	500.
BENZO(K)FLUORANTHENE	430.U	400.U	410.U
BENZO(A)PYRENE	430.U	400.U	240.M
INDENO(1,2,3-CD)PYRENE	430.U	400.U	180.M
DIBENZO(A,H)ANTHRACENE	430.U	400.U	410.U
BENZO(G,H,I)PERYLENE	430.U	400.U	410.U

** NOTE: N/A MEANS NOT ANALYZED **
*** I MEANS ANALYZED BUT INVALID DATA ***

ANALYSIS TYPE: PESTICIDES

TITLE: ATLANTA PWS MATRIX: SEDIMENT UNITS: UG/KG
LAB: IT CERRITOS METHOD: 9302M01 CASE: 7980
SAMPLE PREP:_____ ANALYST/ENTRY: LOB REVIEWER: JSK DATE: 11/24/87

	IK994001	IK994002	IK994003
ALPHA-BHC	21.U	19.U	20.U
BETA-BHC	21.U	19.U	20.U
DELTA-BHC	21.U	19.U	20.U
GAMMA-BHC	21.U	19.U	20.U
HEPTACHLOR	21.U	19.U	20.U
ALDRIN	21.U	19.U	20.U
HEPTACHLOR EPOXIDE	21.U	19.U	20.U
ENDOSULFAN I	21.U	19.U	20.U
DIELDRIN	42.U	9.0	40.U
4,4'-DDE	42.U	38.U	8.4M
ENDRIN	42.U	38.U	40.U
ENDOSULFAN II	42.U	38.U	40.U
4,4'-DDD	42.U	38.U	40.U
ENDRIN ALDEHYDE	42.U	38.U	40.U
ENDOSULFAN SULFATE	42.U	41.	27.M
4,4'-DDT	42.U	38.U	40.U
ENDRIN KETONE	42.U	38.U	40.U
METHOXYCHLOR	210.U	190.U	200.U
CHLORDANE	210.U	190.U	200.U
TOXAPHENE	420.U	380.U	400.U
AROCLOR-1016	210.U	190.U	200.U
AROCLOR-1221	210.U	190.U	200.U
AROCLOR-1232	210.U	190.U	200.U
AROCLOR-1242	210.U	190.U	200.U
AROCLOR-1248	210.U	190.U	200.U
AROCLOR-1254	420.U	380.U	400.U
AROCLOR-1260	210.U	190.U	400.U

** NOTE: N/A MEANS NOT ANALYZED **
*** I MEANS ANALYZED BUT INVALID DATA ***

TITLE: ATLANTIC PUBLIC | MATRIX: SOIL | UNITS: UG/KG
LAB: IT CERRITOS | METHOD: 9302M01 | CASE: 7980
ANALYST/ENTRY: LT | REVIEWER: STANTON | DATE: 11-24-87

TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.	COMPOUND NAME**	FRACTION	EST.	CONC.*
IK994001	NONE	VOA		
IK994001	2 HYDROCARBONS	BNA	300	J
IK994002	NONE	VOA		
IK994002	MOLECULAR SULFUR	BNA	400	J
IK994002	UNSATURATED HYDROCARBON	BNA	300	J
IK994002	BENZO[J]FLUOANTHENE	BNA	300	J
IK994003	NONE	VOA		
IK994003	MOLECULAR SULFUR	BNA	3000	J
IK994003	7 HYDROCARBONS	BNA	200-900	J
IK994001	5 UNKNOWNS	BNA	200-3000	J
IK994001	7 UNKNOWN PHTHALATE	BNA	200-700	J
IK994002	8 UNKNOWNS	BNA	200-800	J
IK994002	UNKNOWN PHTHALATE	BNA	300	J
IK994003	11 UNKNOWNS	BNA	200-3000	J
IK994003	UNKNOWN PHTHALATE	BNA	300	J

*This is a crude estimation based on response relative to an internal standard. An authentic standard has not been run.

**The compounds were identified using a library search routine. Authentic standards have not been analyzed to verify compound mass spectra and retention times.

ECOLOGY AND ENVIRONMENT, INC.
Kansas City TAT 7 Office

MEMORANDUM

TO: R.D. Kleopfer, Acting Chief, LABO
THRU: Ron McCutcheon, DPO

FROM: Jeffrey Stanton, TAT
THRU: Audra Gier, ATATL
Paul Kopsick, ATATL

DATE: November 24, 1987

SUBJECT: Review of data for Atlantic Public Water Supply
TDD# T07-8709-002
PAN# T07-Z054-QSC

These data were reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses," April 11, 1985 revision and the "Laboratory Data Validation Functional Guidelines for Evaluating Pesticides and PCBs."

The following comments and attached data sheets are a result of Ecology & Environment's review of the above mentioned data from the contract laboratory.

CASE NO.: 7980	LABORATORY: IT Cerritos
CONTRACT NO.: 68-01-726	METHOD NO.: 9302M01
SITE: Atlantic Public Water	MATRIX: Soil
SMO SAMPLE NOS.: GC866-868	EPA SAMPLE NOS.: IK994001-003

1. These analyses were for total organics (volatiles, extractables and pesticides/PCBs) per low level IFB protocol.

2. Bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP) tunings and mass calibrations were satisfactory for the GC/MS volatiles and extractables analyses.

3. In the initial and continuing calibrations for the volatiles/extractables, 2-butanone and 3-nitroaniline had weak responses (average RRFs or RF50s less than 0.05). Associated non-detects have been invalidated as a result.

In the volatiles/BNA continuing calibrations, various compounds exceeded %-difference limits, however no positives were associated with these.

All system performance and calibration check compound criteria were met.

Pesticide initial calibration linearity was demonstrated as the differences between calibration factors for Aldrin, Endrin, DDT and DBC had less than 10% RSD in the linearity evaluation

check. The continuing calibrations heptachlor and methoxychlor exceeded %-difference limits, but as no positives were associated with these calibration checks, no action was taken.

4. Methylene chloride, acetone and toluene were reported in the volatiles method blank. Results for these volatiles in the samples were qualified by blank rules.

Two unknowns (scan #s 509 and 518) were reported in the BNA method blank. No unknowns with similar scan #s were reported on the tentatively identified compounds lists.

No pesticides/PCBs were reported in the pesticides method blank.

No field blank was associated with this set of data.

5. GC/MS instrument performance was satisfactory based on a comparison of internal standard response areas in the samples versus those in the associated daily calibrations.

Pesticide instrument performance was satisfactory based on:

a. DDT retention times were greater than 12 minutes.

b. Endrin and DDT breakdown were less than 20%.

c. DBC retention time shifts were less than 2% (packed columns).

d. Positive responses for pesticides in the samples fell within the established retention time windows.

e. The analytical sequence was followed.

6. All surrogate recoveries were within control limits for the volatile, BNA and pesticide/PCB analyses.

7. All matrix spike RPDs were in control and all recoveries were in control with the exception of those of Dieldrin in the pesticide fraction, which were high. As the recoveries of dieldrin in the matrix spikes were almost identical, this would indicate a matrix effect for this sample. THe lab had indicated a retention time shift for gamma-BHC in the matrix spike duplicate of this sample due to matrix effects. Matrix spike limits are advisory only.

8. GC/MS confirmation of pesticides in the samples was not done as their concentrations were not high enough.

9. No performance evaluation sample was associated with this set of data.

10. Calculations were checked, and though the lab deviated drastically from the method in the manner in which their extracts were split and in the amount of internal standard used, the calculations were eventually found to be correct.

CHAIN OF CUSTODY RECORD
ENVIRONMENTAL PROTECTION AGENCY REGION VII

FIA0194SA

ACTIVITY LEADER(Print)	NAME OF SURVEY OR ACTIVITY	DATE OF COLLECTION	SHEET
PHILIP DULA	ATLANTIC PUBLIC WATER SUPPLY	24-28 (DAY) 9 (MONTH) 87 (YEAR)	1 of 1

CONTENTS OF SHIPMENT FIA0194SA

SAMPLE NUMBER	TYPE OF CONTAINERS: CUBITAINER	BOTTLE	BOTTLE	BOTTLE	VOA SET (2 VIALS EA)	SAMPLED MEDIA: water	soil	sediment	dust	other	RECEIVING LABORATORY REMARKS/OTHER INFORMATION (condition of samples upon receipt, other sample numbers, etc.)
	NUMBERS OF CONTAINERS PER SAMPLE NUMBER										
IK994001	1	2			1		X				POSSIBLE MEDIUM CONCENTRATION
IK994002	1	2			1		X				POSSIBLE MEDIUM CONCENTRATION
IK994003	1	2			1		X				POSSIBLE MEDIUM CONCENTRATION

DESCRIPTION OF SHIPMENT

12 PIECE(S) CONSISTING OF 1 BOX(ES)

_____ ICE CHEST(S); OTHER _____

MODE OF SHIPMENT

_____ COMMERCIAL CARRIER: _____

_____ COURIER

X SAMPLER CONVEYED

FIA0194S.1 (SHIPPING DOCUMENT NUMBER)

PERSONNEL CUSTODY RECORD

RELINQUISHED BY (SAMPLER)	DATE	TIME	RECEIVED BY	REASON FOR CHANGE OF CUSTODY
Philip Dula ☒ SEALED ☐ UNSEALED	8-31-87 12:00	1200 12:25	☐ SEALED ☐ UNSEALED	
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY
RELINQUISHED BY ☐ SEALED ☐ UNSEALED	DATE	TIME	RECEIVED BY ☐ SEALED ☐ UNSEALED	REASON FOR CHANGE OF CUSTODY

7-EPA-9262(Revised 5/85)

FIELD SHEET

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: ATLANTIC PUBLIC WATER SUPPLY Site Number:
Location: ATLANTIC IA Site Docs:

Collected: YR: (87) MO: 8 Day: 24 Time: 1545/1600 Leader: PHIL DULA

Sample Number: IL994001 SMO #:

Sample Media (circle one):
(SOIL) DUST, RINSATE, SEDIMENT, WATER, OTHER:_____

Sample Split (circle one): YES (NO)

Sample Container	Tag Color	Preservative	Analysis Requested
1 OZ JAR	PURPLE	NONE	PESTICIDES
8 OZ JAR	PURPLE	NONE	BNA
2 40 ML VIAL	LIME	NONE	VOA

Depth: 4 TO 5 FT Pan #: FIA0194SBF Aliquots: ONE

Samplers: PHILIP DULA & KEVIN HUGILL

COMMENTS OF FIELD PERSONNEL

Site Description: PROBE LOCATION #1 - SAMPLE CONSISTS OF SOIL WITH HIGH CLAY CONTENT. DARK BROWN TO GRAY BLACK SOIL. SOIL IS VERY PLASTIC IN CONSISTENCY. THIS MAY BE DUE TO RAINY WEATHER ON 8-24-87.

IBM-PC

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: ATLANTIC PUBLIC WATER SUPPLY Site Number: [illegible]
Location: ATLANTIC IA Site Desc:

Collected: YR: (87) MO: 8 Day: 27 Time: 1030 Leader: PHIL DULA

Sample Number: IK944Ø02 SMO #:

Sample Media (circle one):
(SOIL) DUST, RINSATE, SEDIMENT, WATER, OTHER: _____

Sample Solit (circle one): YES NO

Sample Container	Tag Color	Preservative	Analysis Requested
8 OZ JAR	PURPLE	NONE	PESTICIDES
8 OZ JAR	PURPLE	NONE	BNA
2 40 ML VIAL	LIME	NONE	VOA

Depth: 2-3 FT Pan #: FIAØ1945B Aliquots: 2

Samplers: PHILIP DULA, JEAN CARLETON

COMMENTS OF FIELD PERSONNEL

Site Description: ATLANTIC P.W.S ATLANTIC, IOWA

SAMPLE LOCATION - PROBE LOCATION # 5
30 FT EAST PROBE LOCATION #5

IBM-PC

FIELD SHEET
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VII
ENVIRONMENTAL SERVICES DIV. 25 FUNSTON RD. KANSAS CITY, KS 66115

Site Name: ATLANTIC PUBLIC WATER SUPPLY Site Number:
Location: ATLANTIC IA Site Code:

Collected: YR: (87) MO: 8 Day: 28 Time: 1000 Leader: PHIL DULA

Sample Number: IL994003 SMO #:

Sample Media (circle one):
(SOIL) DUST, RINSATE, SEDIMENT, WATER, OTHER: _____

Sample Split (circle one): YES (NO)

Sample Container	Tag Color	Preservative	Analysis Requested
8 OZ JAR	PURPLE	NONE	PESTICIDES
8 OZ JAR	PURPLE	NONE	BNA
2 40 ML VIAL	LIME	NONE	VOA

Depth: 0-4' Pan #: FIA0194SB Aliquots: 5

Samplers: PHILIP DULA

COMMENTS OF FIELD PERSONNEL

Site Description: PROBE LOCATION #77

IBM-PC

APPENDIX G

GEOGRAPHIC EXTENT OF PCE PLUME, ATLANTIC, IOWA
PLAT-1

GEOGRAPHIC EXTENT OF PCE PLUME
ATLANTIC PUBLIC WATER SUPPLY
ATLANTIC, IOWA

EXPLANATION

CONCENTRATION OF PCE IN UG/L

MUNICIPAL WATER WELL

SOIL-GAS SAMPLE LOCATION - SAMPLE COLLECTED

SOIL-GAS SAMPLE LOCATION - SAMPLE NOT COLLECTED

* FULL VACUUM RELEASE WAS NOT ESTABLISHED IN COLLECTING SAMPLE DUE TO HIGH CLAY CONTENT OF SOIL. CONCENTRATIONS OF PCE EXPECTED TO BE HIGHER THAN INDICATED.

SCALE

0 200

FEET

DIRECTION OF GROUND WATER FLOW

N

ecology and environment, inc.
CLOVERLEAF BUILDING 3, 6405 METCALF
OVERLAND PARK, KANSAS 66202

BASE PHOTOGRAPH: H. GENE McKEOWN & ASSOCIATES INC. 1979
PREPARED BY: C. WILLIAMS
FIT MARCH 1988

TROUBLESOME CREEK
OBEE
BUTTERMILK
SUBLOT 1 OF LOT 1 8.269 Ac.
SUBLOT 3 OF LOT 1 11.455 Ac.
SUBLOT 4 OF LOT 1 2.092 Ac.
LOT 1 OF SUBLOT 2 OF LOT 1 3.475 Ac.
PERMANENTLY CAPPED
A.M.U. POWER STATION
IOWA INTERSTATE RAILROAD
BUTTERMILK CREEK
INTERMITTENT POND
VACATED STREET R/W
FORMER BOWLING PIN FACTORY
SYCAMORE VILLAGE TRAILER PARK
DEFUNCT LUMBER COMPANY
K-MART
PROBE REFUSAL
LORSCHELN FARM SUPPLY
FORMER MOBIL GAS STATION
FORMER IDOT LAB
HARDEE'S
CASS COUNTY MEMORIAL HOSPITAL
EAST TENTH
OLIVE STREET
SPRUCE STREET
PINE STREET
MULBERRY STREET
CHERRY STREET
PLUM STREET
THIRD STREET
4th STREET
5th STREET
6th STREET
7th STREET
8th STREET
9th STREET
10th STREET
SEVENTH STREET